April 2, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

ECHNOLOGY DEPT.

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DETROIT

INLAND STEEL COMPANY
CHICAGO

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Sizes . . . from rolls for an 8-inch mill, all intermediate sizes, up to large plate mill rolls, 34" x 206".

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DESIGNERS AND BUILDERS to the Steel, Non-Ferrous and Chemical Industries.

ASSOCIATED COMPANIES:
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JOHN INGLIS COMPANY, LIMITED, TORONTO, ONTARIO, CANADA

"SURE, keep the hanger"

Remember the days when each of your freshly cleaned and pressed suits was delivered to your door draped on a wire coat hanger, and the hanger was yours at no extra cost? Most people didn't fully appreciate hangers until they were no longer obtainable.

There's no need to remind you manufacturers of the present scarcity of wire for coat hangers, and a lot of other convenient peacetime gadgets. You've been trying to buy bright wire for a long while, and we appreciate the difficulty you've experienced.

There's no telling when the situation may be eased, but you may be certain that Bethlehem wire mills will make every effort to again meet your requirements, just as soon as conditions permit. As long as there is a war to be won, helping to win it is our job; but the sooner it's won, the sooner will Bethlehem wire and rods again be available in quantity for the manufacture of peacetime products.

BETHLEHEM STEEL COMPANY
GENERAL OFFICES: BETHLEHEM, PA.

Bethlehem Steel Export Corporation
New York City

★ BETHLEHEM STEEL ★ **BETHLEHEM WIRE**

200 TON ALLIANCE STRIPPER CRANE HELPS SPEED INGOT HANDLING ON WEST COAST

ALLIANCE completed an installation in the Kaiser plant at Fontana, California, of a 200-ton combination stripper and extractor, 61-foot span. This unit, equipped with a retractable bull-nose will strip either the standard small end-up ingots or large end-up ingots with hot tops.

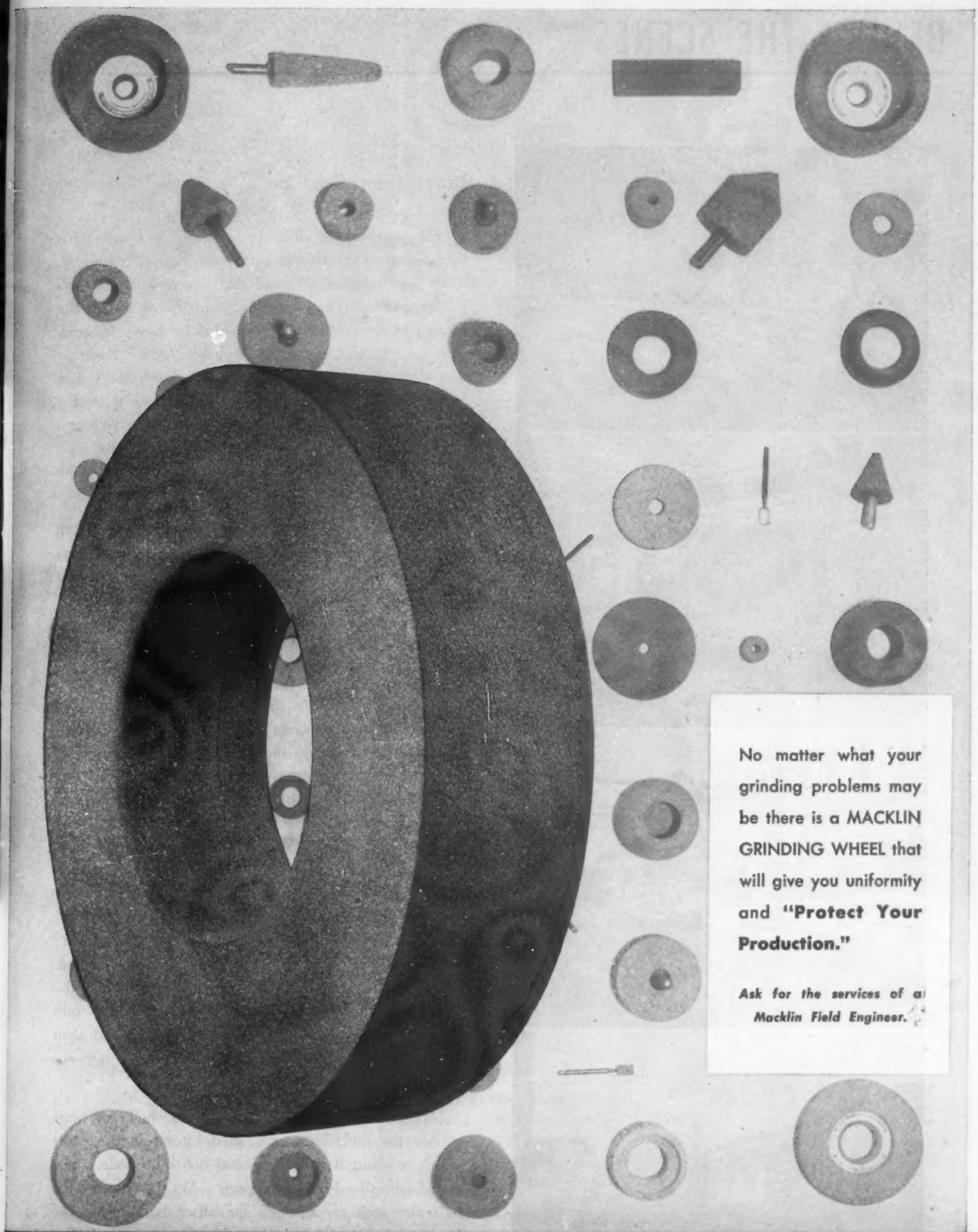
For 43 years, our business has been that of manufacturing machinery to speed steel mill production. Our list of customers reads like a blue book of industry, and you will find Alliance equipment in practically every steel plant in this country and many foreign lands.

The war has re-emphasized our position as "The World's Largest Builders of the World's Largest Cranes." Much of the equipment for handling ingots and ladles, installed in steel plants during the war period, has been Alliance.

LADLE CRANES . GANTRY CRANES . FORGING MANIPULATORS . SOAKING PIT CRANES STRIPPER CRANES . SLAB AND BILLET CHARGING MACHINES OPEN HEARTH CHARGING MACHINES.

Alliance

THE ALLIANCE MACHINE CO., ALLIANCE, OHIO - SPECIAL AND STANDARD CRANES FOR HEAVY DUTY



No matter what your grinding problems may be there is a MACKLIN GRINDING WHEEL that will give you uniformity and **"Protect Your Production."**

Ask for the services of a Macklin Field Engineer.

MACKLIN COMPANY

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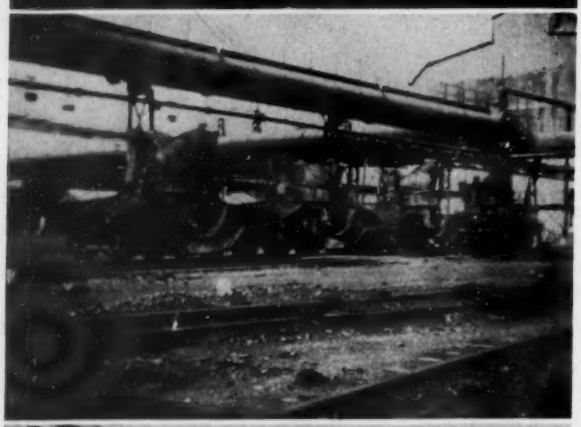
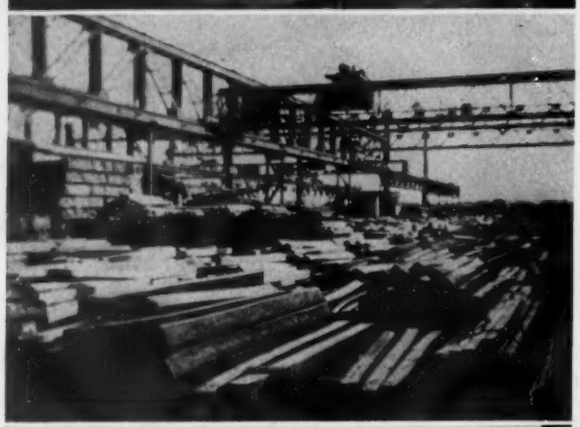
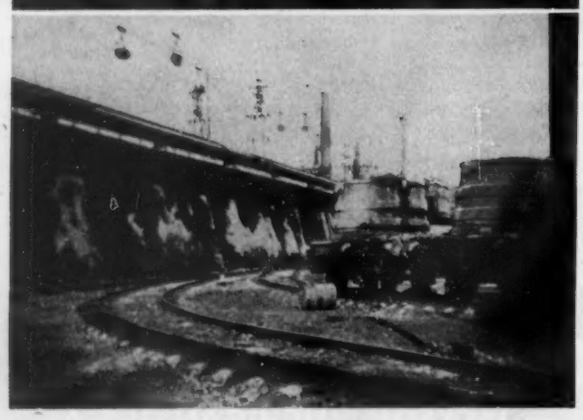
BEHIND THE SCENES







Letter from G.I. Joe

■ Frequently it is difficult to understand just what happens when the tide of battle sweeps over a country. After the last war some of the returning Doughboys told interesting tales of certain plants being spared the ravages of war, although surrounded by heavy fighting. The same thing seems to be happening now. Recently one of the Penton editors received an interesting letter from an army engineer in Luxembourg which tells of a steel plant that escaped destruction on the Western Front. The G. I. Joe seems just as perplexed over what is taking place as was the Doughboy 25 years ago. The letter in part is as follows:

"All is still well here in Luxembourg. It is snowing outside, with the weather here being about the same as in Ohio. We have not been doing much in the past few days, mostly road patrol, but soon things will break, and we will catch hell. As one associated with the metalproducing industries you may be interested in the enclosed photographs.

"I took these while up in a certain steel mill in Hagendingen. This is one time when Hermann Goering has put his efforts into the American war effort. This mill was one of his biggest and best. Much to his surprise he found one fine October morning that he had been moved out of his office and was replaced by the American G. I. Joe. We took 24-inch I-beams from his stockpile and used them on our bridge construction while the Germans were just a few miles outside the mill, and our mortar and artillery units were near by. Why the Germans did not bomb the mill as we were borrowing their steel is more than I can understand I have been told and read how our air force bombs the different mills, but the Germans protected this mill against sabotage until the Americans arrived and then turned it over to the Doughboys. War surely is peculiar.

"After the Germans left they would shell our units outside the mill, but not a shell hit inside the plant which is about 3 miles long and one mile wide. The forced labor lived on the property. My trips around the mill also took me through the office buildings. The files had been scattered about by the Germans before leaving, and this letter is written on the company stationery with Goering's name in prominent letters."

Vol. 116, No. 14, April 2, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

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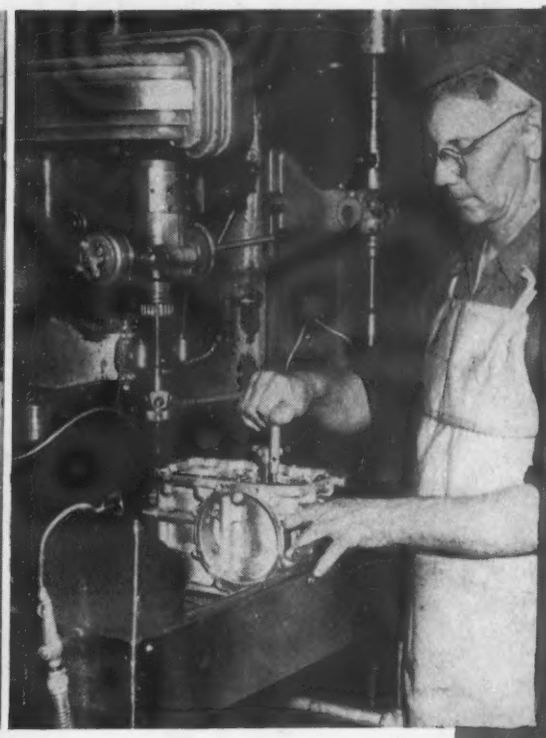
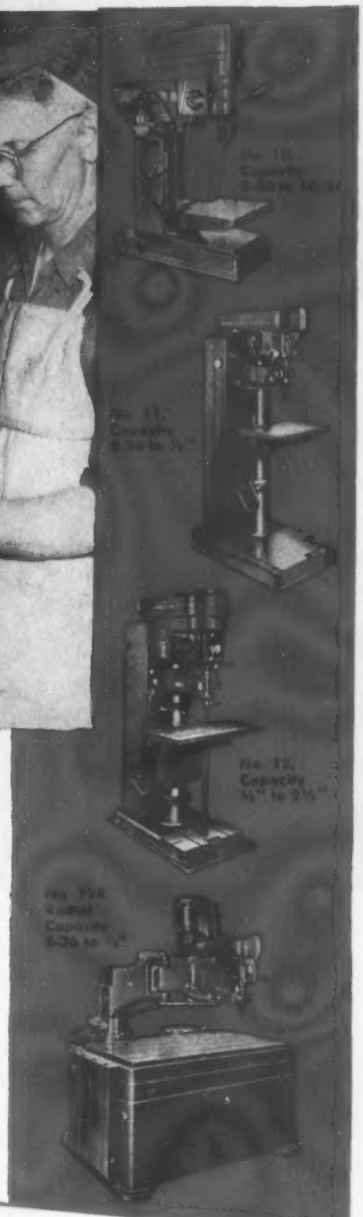




Having trouble with
CLASS 3 and 4 THREADS?

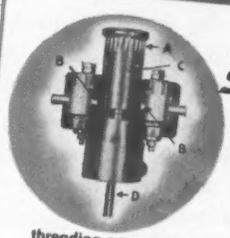
IN plant after plant at the beginning of the war, scrap piled up and production slowed down because usual equipment could not produce the class 3, 4 and 5 threads demanded for precision aircraft parts and other war material. If you have had trouble with precision threading, take a tip from the hundreds of plants who have since licked this problem by installing Warner & Swasey precision threading and tapping machines.

These machines were designed and built specifically for precision tapping of class 3, 4 and 5 fits in mass production quantities. Wherever they are installed, tap life multiplies, scrap percentages drop to the disappearing point, and overall production heads for the ceiling.

In a huge Naval Ordnance Plant, scrap loss runs 20 to 40% on conventional equipment. On a Warner & Swasey precision threading and tapping machine, the loss is 5%.

A famous mid-west manufacturer of tractors reports an increase in tap life from 46 pieces to 1140 pieces on switching to a Warner & Swasey. The job was a 1" 16-pitch thread.

These are but two of scores of examples of what these machines are doing. Why not investigate now? Let a Warner & Swasey Field Engineer give you the complete story.



Secrets OF THIS *Success*

A completely new and exclusive principle—the combination of lead screw and electrically actuated guide fingers guarantee tapping and threading accuracy. The upper portion of the lead screw (A) is a hob which cuts mating threads into the brass guide fingers (B) to match the pitch of the lead screw (C) and the tap (D). Solenoid action engages the guide fingers and lead screw to maintain precision lead during the tap travel. This patented mechanism compensates for wear of guide fingers against lead screws and eliminates lead errors and backlash.

An automatic safety clutch releases and stops the tapping operations if the tap becomes dull, hits a hard spot, or strikes chips in a blind hole. Figures show that this feature alone pays for the machine in increased tap life.

A super-sensitive depth control holds tap depths to 1/10 revolutions. Operator simply sets a dial to the depths wanted.

You Can Machine It Better, Faster, For Less . . . With A Warner & Swasey

TURRET LATHES, SADDLE AND RAM TYPES—CHUCKING AND BAR TOOLS
—PRECISION TAPPING AND THREADING MACHINES

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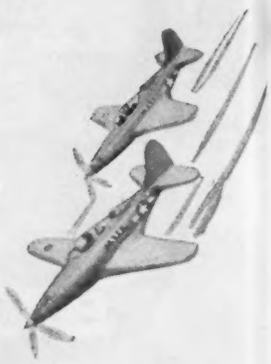
JUST HOW IMPORTANT IS A HUB NUT



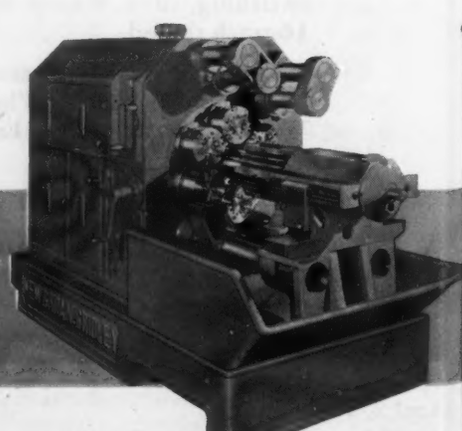
AIRPLANE PROPELLER HUB NUT, REQUIRES FIFTEEN CUTS TO ASSURE EXTREME ACCURACY.

At twenty thousand feet, with the prop turning up 1800 R. P. M. this hidden part is strictly a matter of life and death to the pilot. Naturally it's not one of the things he worries about . . . he doesn't *have* to . . . because the manufacturer of his new type hollow ribbed steel automatic propeller left nothing to chance.

Production of faultless unseen components like propeller hub nuts present real manufacturing problems. This world famous manufacturer wisely turned the job over to the Model 675 New Britain Chucker, fully equipped with the latest carbide tipped tools. Then the high sustained production of the part . . . demanding smooth finish and complex, accurate cuts . . . became a routine procedure.

It is a typical example of how American Industry is turning out new and better weapons of war that command the respect and admiration of the men who stake their lives on mechanical perfection.

New Britain automatics can furnish the right answer to production puzzles in your plant, now and postwar. Check your problems with the *New Britain* sales-engineer in your district today.



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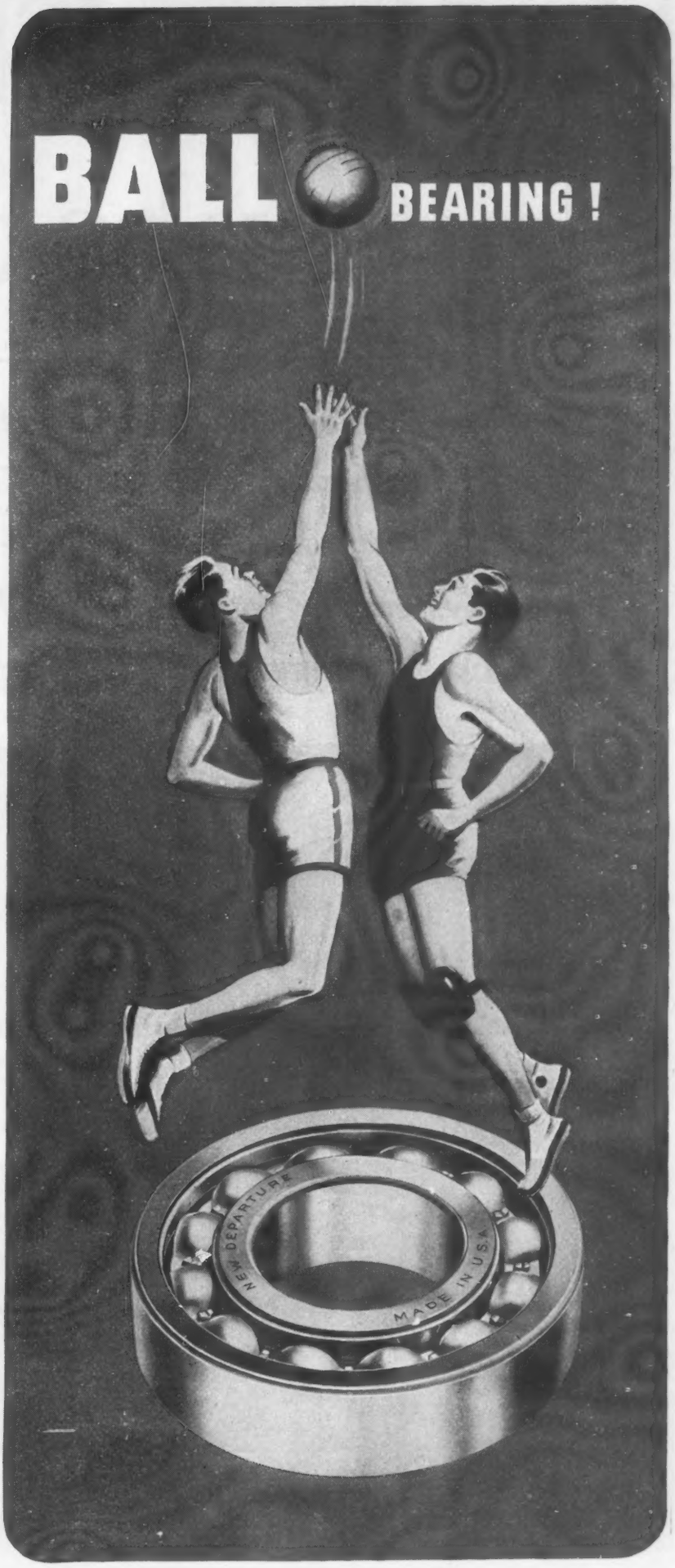
Keep your eye on the BALL BEARING!



For success in sports, keep your eye on the ball. For success in Tomorrow's higher speed industry, keep your eye on the *Ball Bearing!*

More than 300 million New Departure Ball Bearings are at work in this war—but that's just the beginning . . .

For entirely new conceptions of machine power and *speed* have been born, rendering much machinery obsolete and proving repeatedly, that the *Ball* Bearing has more of the characteristics *indispensable* to higher speeds, heavier loads and maximum rigidity.

There is no substitute for Ball Bearings and no substitute for the technical experience and creative engineering that go into New Departure Ball Bearings.

So . . . keep your eye on the Ball Bearing . . . the New Departure Ball Bearing. That's keeping your eye on *Tomorrow!*

Ask for your copy of "Why Anti-Friction Bearings?"

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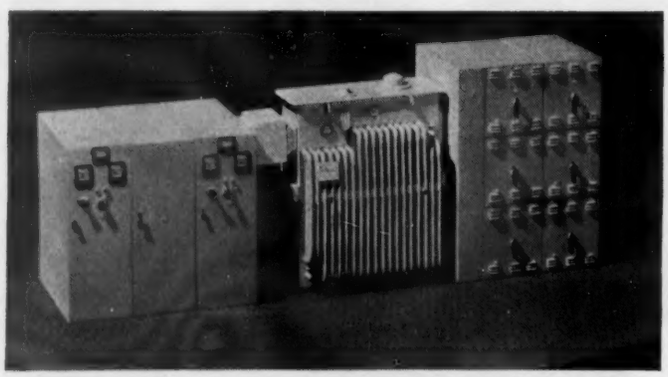
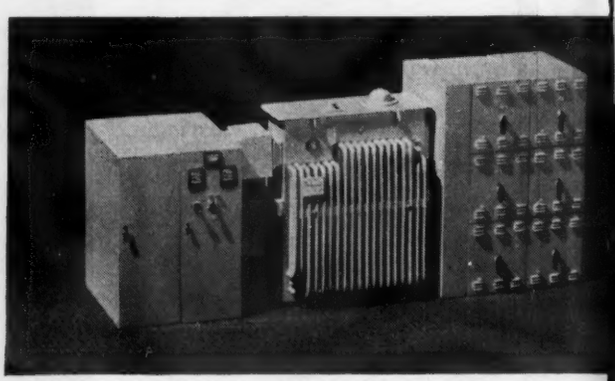
See how Flexible Unit Subs can be!

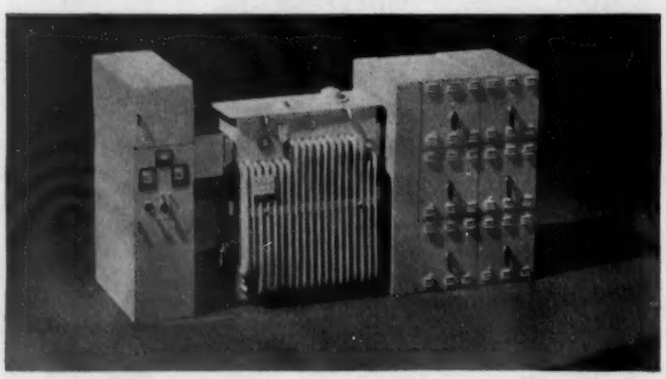
All possible substation arrangements are at your finger tips when you use Allis-Chalmers "Unit Sub Builder" Set to help you plan the right power distribution system for your plant. What load center unit substation arrangement is best for you?



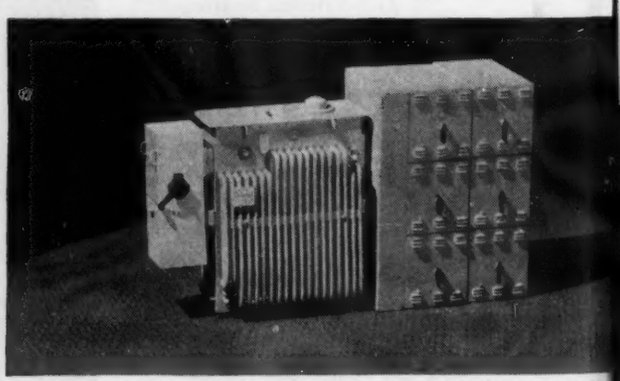
1 High voltage switchgear arranged for two incoming lines, liquid-filled transformer, simplest possible low voltage unit assure extremely dependable power supply. Primary breakers operate electrically.



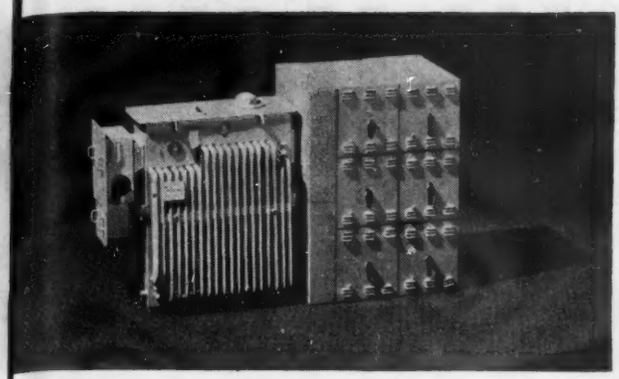
2 One incoming line. As in set up 1, equipment can have almost any primary metering, relaying. However, breaker may be manually operated and only potential transformers required as in . . .



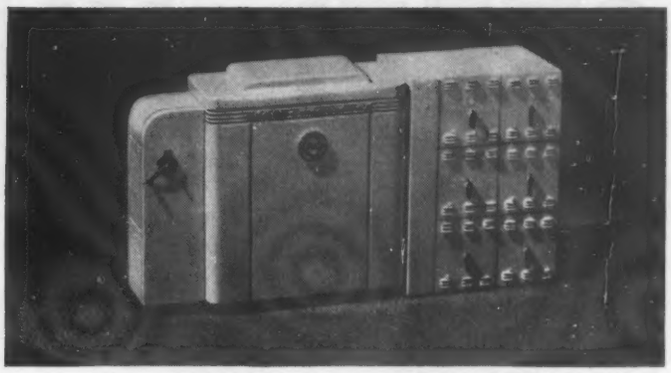
3 Common HV arrangement. Auxiliary compartment is not required. A set of potential transformers is mounted in a superstructure which can be removed if transformers are not needed.



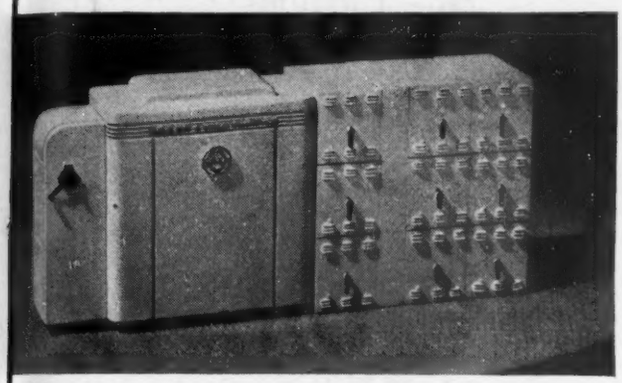
4 Load break switch-fuse — throat-connected (as here) or mounted directly on the transformer — replaces breaker. Where only disconnect switch is used, the substation would appear as set up 5.



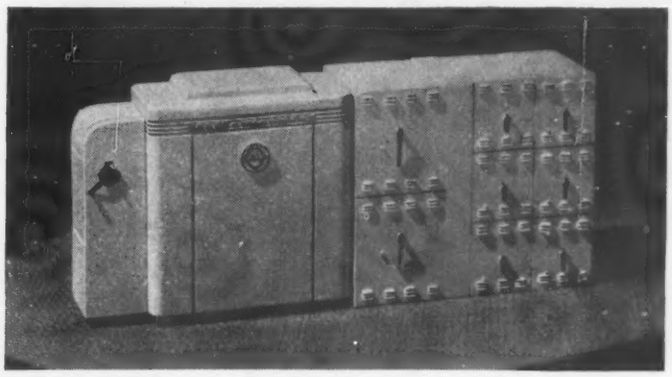
5 Disconnect switch is most common HV arrangement. Requiring back-up protection of a circuit breaker, it is used with liquid-filled transformer (above) . . . or dry-type (next illustration).



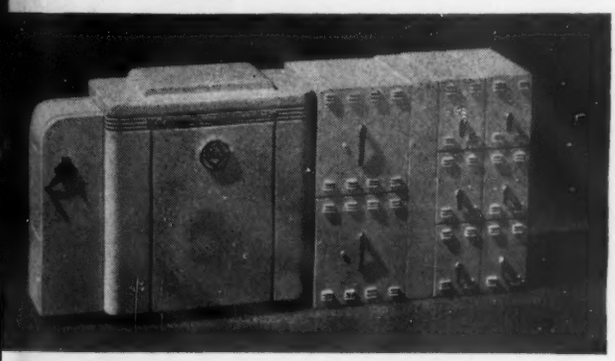
6 If disconnect switch will break magnetizing current only, it requires an interlock. Simplest and most positive is a key interlock to the transformer secondary breaker, as in photo 7.



7 Here, disconnect switch may be interlocked with main secondary breaker. However, all current from the transformer must flow through this breaker — requiring a larger breaker as in . . .



8 A 750 kva, 240 v transformer needs 50,000 amp breakers if direct-connected to transformer. Main breaker, when used (photos 8, 9) must carry 1800 amps, be rated 75,000 amps.



9 Same transformer . . . using cascaded 75,000 amp main breaker, 25,000 amp feeder breakers. Main breaker can handle maximum short circuit of 48,000 amps. All feeders lose load when one faults.

10 To see how Allis-Chalmers "Unit Sub Builder" Set can help you, call your nearby A-C district office for a showing. No obligation, of course. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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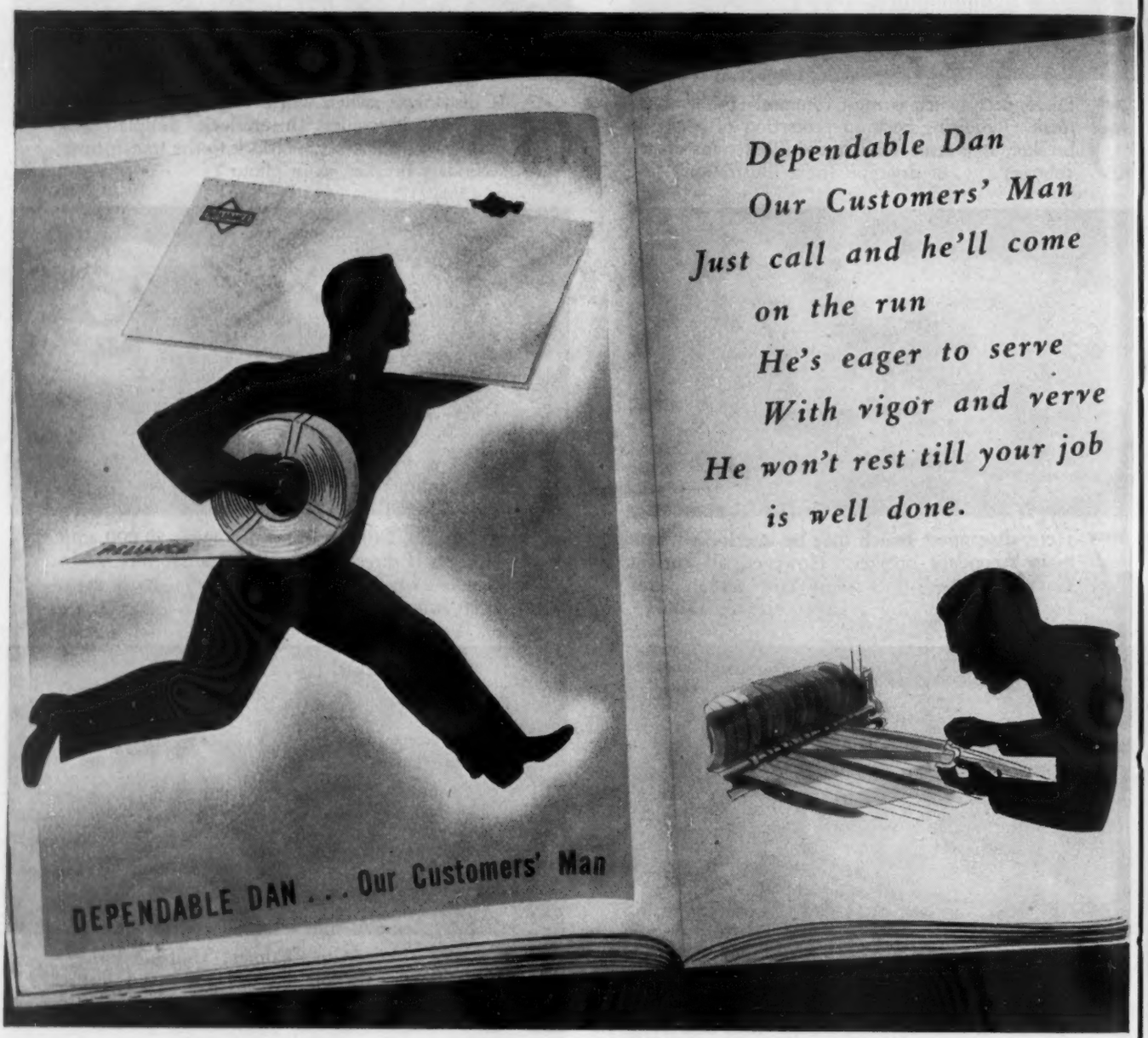
STEEL "KNOW-HOW"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He won't rest till your job
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Keep the typist's fingers at the keyboard where they belong . . . with Uarco **continuous-strip** forms. These forms, already interleaved with carbon, automatically feed the typewriter . . . eliminate carbon fuss and bother, aligning trouble and wasteful inserting motions. Uarco **continuous-strip** record forms put an end to the "stop" in record writing.

Uarco **continuous-strip** forms are scientifically designed to speed the flow of work by giving up-to-the-minute data on every business transaction. They lessen the possibility of error, eliminate duplication of effort and improve departmental co-ordination throughout the organization.

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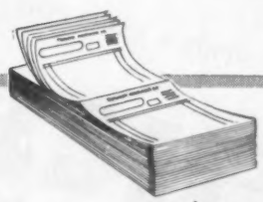

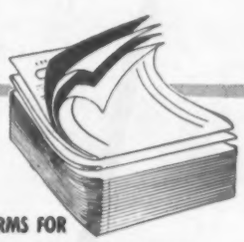

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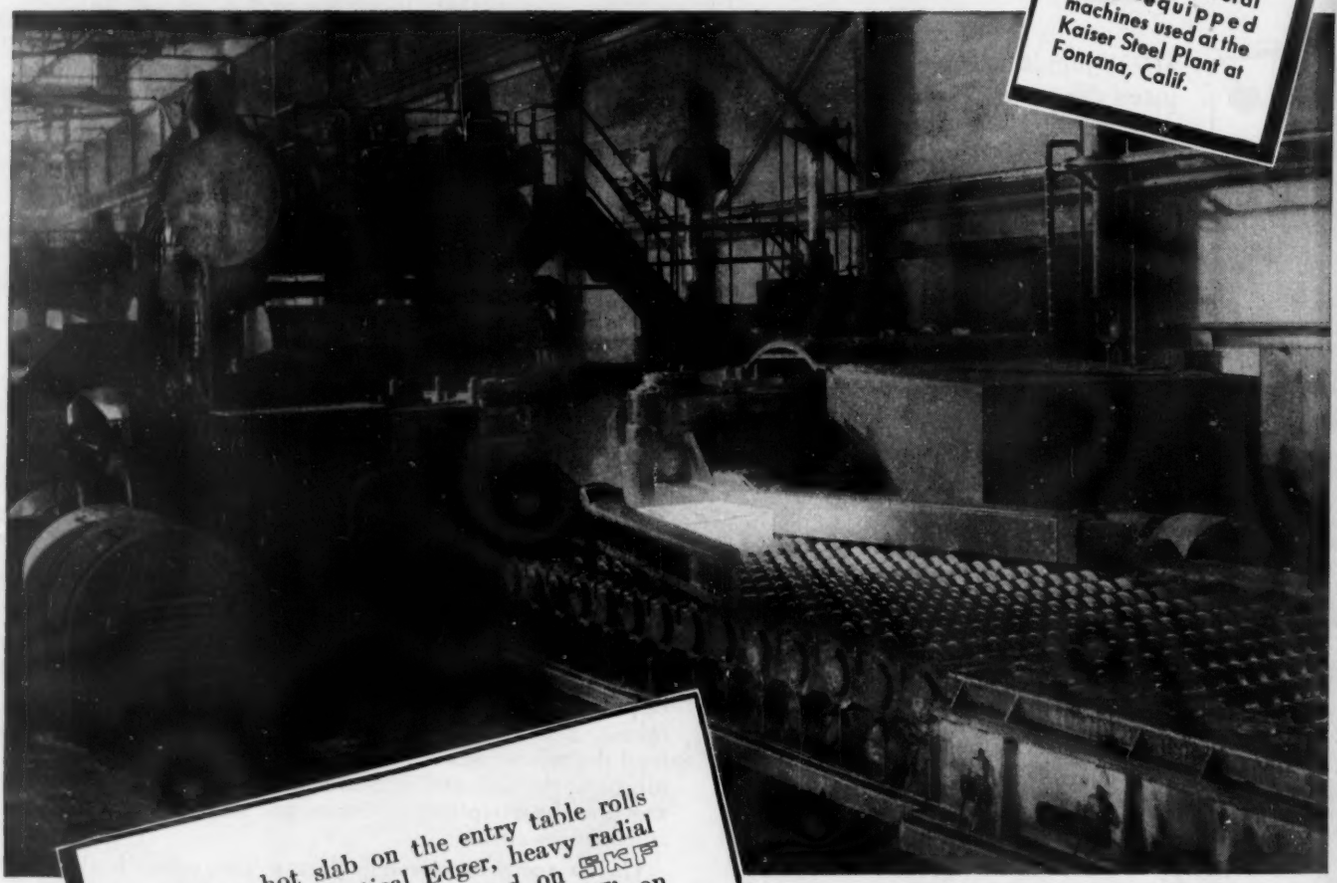
UARCO

BETTER BUSINESS FORMS

ON THE 44" VERTICAL EDGER AT FONTANA

Built by LEWIS FOUNDRY & MACHINE, this 44" Vertical Edger is one of several SKF-equipped machines used at the Kaiser Steel Plant at Fontana, Calif.



When a hot slab on the entry table rolls into this 44" Vertical Edger, heavy radial and thrust loads are imposed on SKF Spherical Roller Bearings. But SKF's on vertical rolls and drive shafts take them easily, and steel men who have used SKF Bearings know why. Because built-in alignment enables SKF's to compensate for shaft deflections, distortions or weave without binding. Because the resultant high capacity is always available for useful work. In exchange for only occasional lubrication, SKF's give a long life of trouble-free performance.

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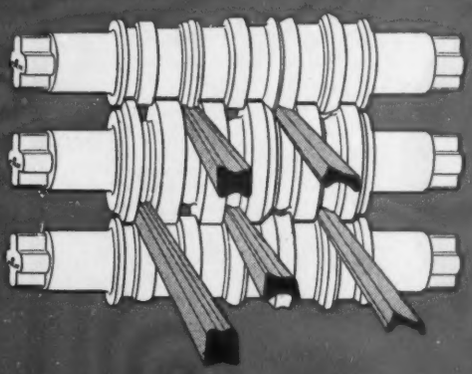
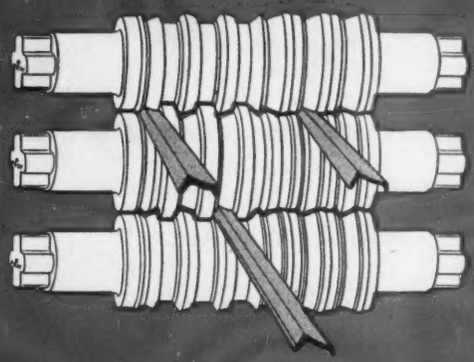
SKF

BALL AND ROLLER BEARINGS

ROLLING TECHNIQUE ...

Bulb Angles

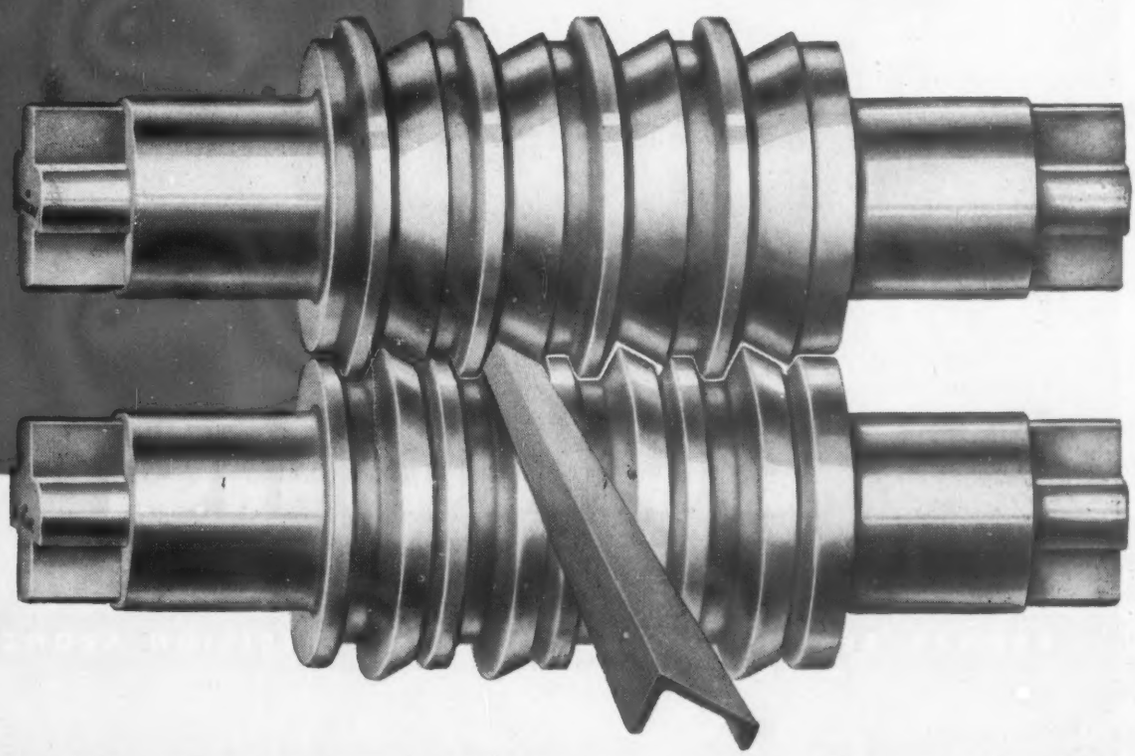




The technique of hot rolling steel or non-ferrous materials into desired shapes must conform to both cost and quality standards. Rolling with the minimum number of passes is desirable but should not be practiced at the expense of quality, finish or strength of the finished product.

For the construction of our vast fleets of naval and merchant vessels many hundred thousand linear feet of Bulb Angles are required—much of which passes through Pittsburgh Precision Rolls *at less cost per ton of steel rolled.*

PITTSBURGH ROLLS
Division of Blaw-Knox Company
PITTSBURGH, PA.



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Bunting, largest producer of Cast Bronze Bearings for Aircraft Engines, has the skill, experience and equipment to make equally fine Cast Bronze Bearings for many other applications. These bearings excell in precision, fine finish and uniform physical and metallurgical qualities. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Warehouses in principal cities.

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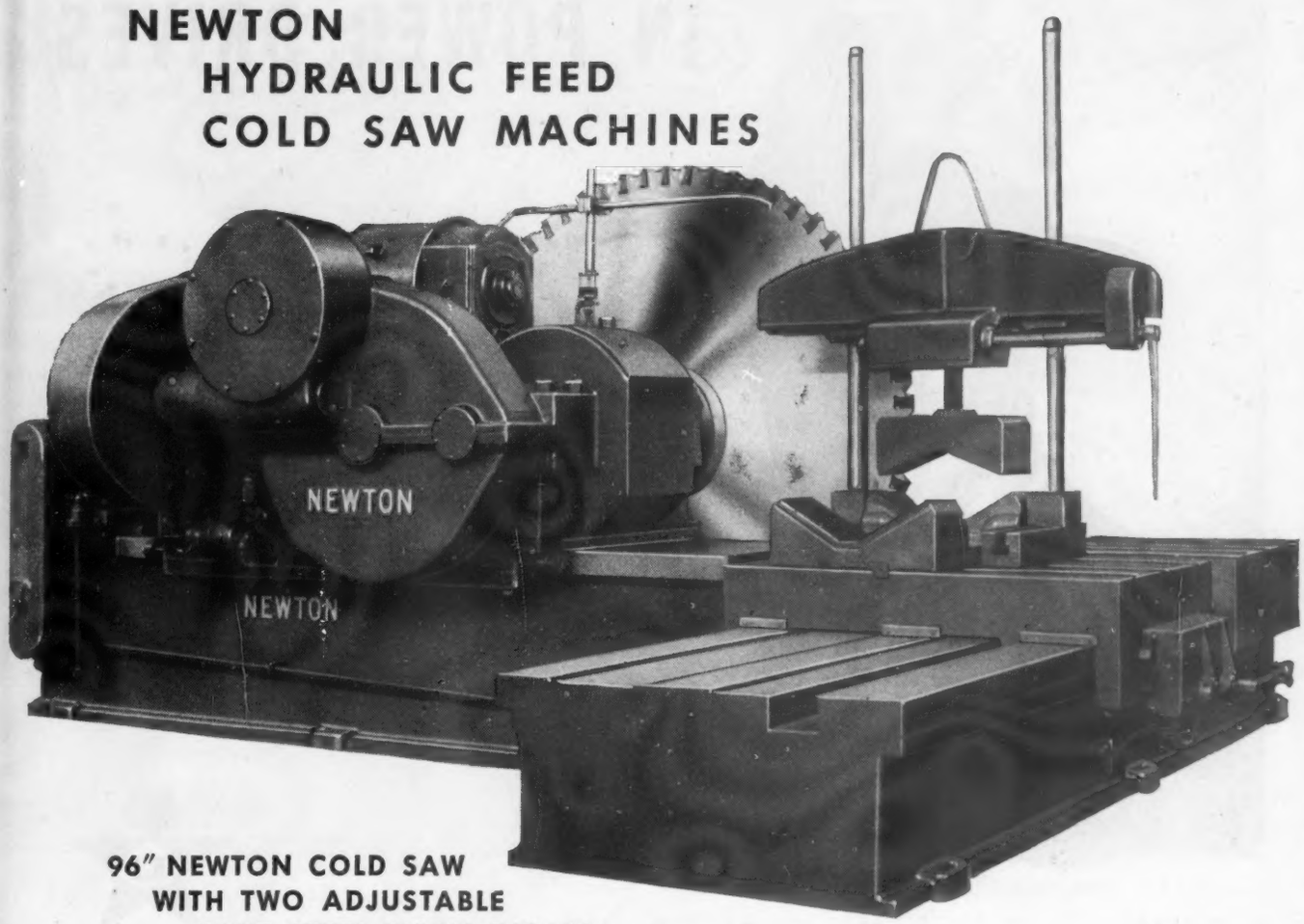
. . . . faster feed, less frequent tooth and blade replacements

NEWTON HYDRAULIC FEED COLD SAW MACHINES



96" NEWTON COLD SAW WITH TWO ADJUSTABLE CAST STEEL WORK TABLES AND HEAVY DUTY CLAMP

★ *The new Newton Cold Saw Machine Bulletin No. 537 is now ready. Write for your copy—today.*

NEWTON Hydraulic Cold Saw Machines are built in a range of designs of proved adaptability to handling all types of work in either ferrous or non-ferrous metals. Built in sizes to accommodate blades from 32" to 120" diameter.

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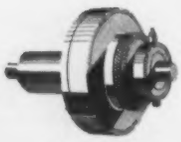

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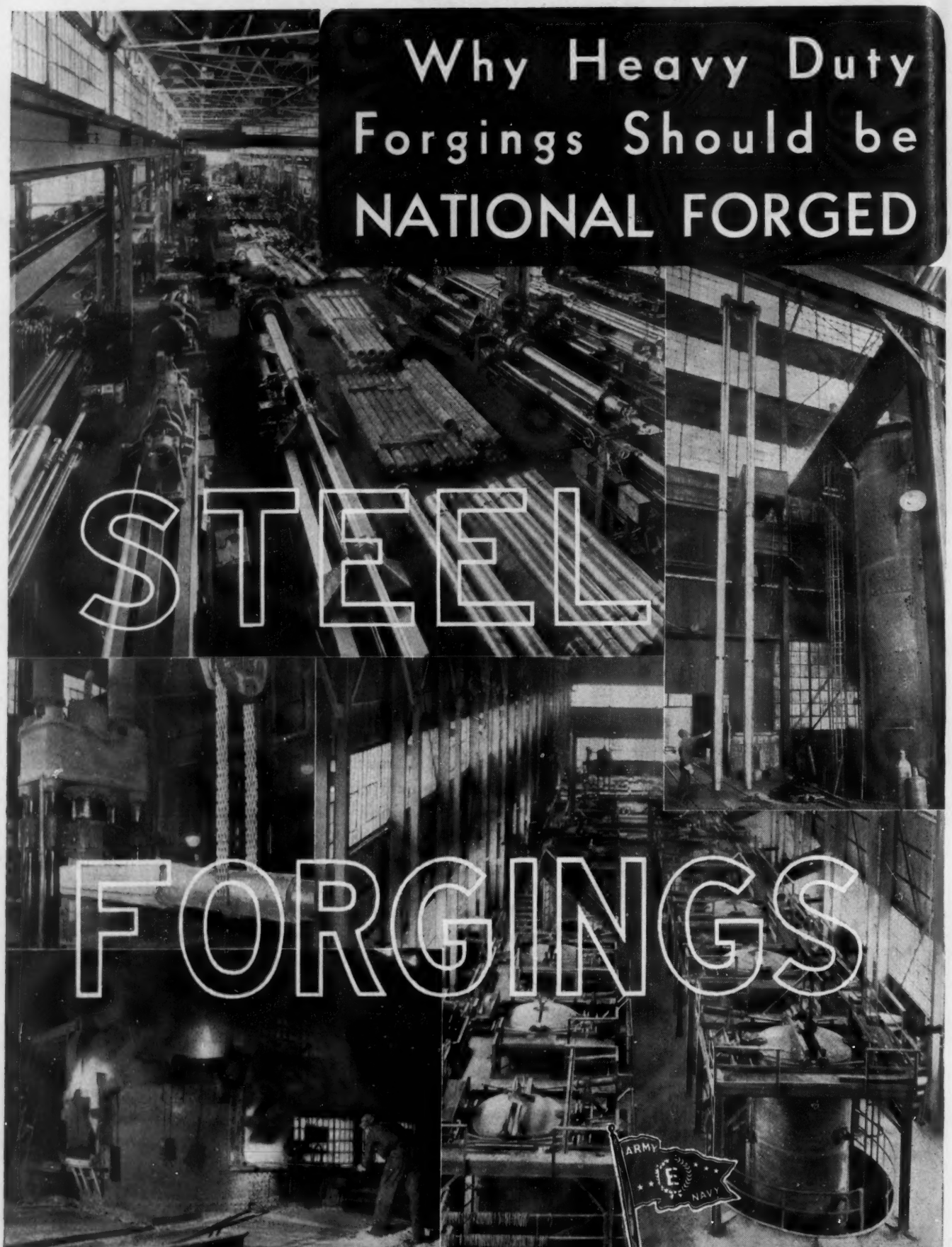
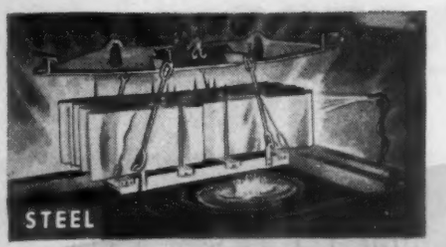


NATIONAL FORGE & ORDNANCE COMPANY

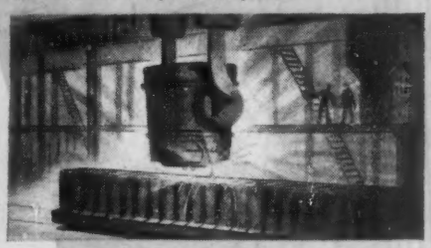
IRVINE, WARREN COUNTY, PENNSYLVANIA

FOR DEPENDABILITY IN METAL CHEMICALS

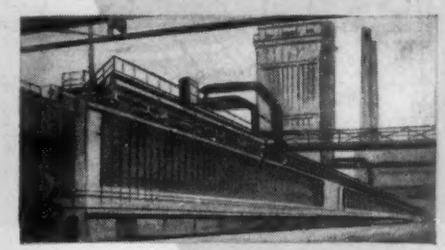


PICKLING—Sulfuric Acid—Hydrofluoric Acid—Muriatic Acid—Nitric Acid—Phosphoric Acid—Chromic Acid.

Detergents: Sodium Metasilicate—Trisodium Phosphate—Sodium Silicate—Tetrasodium Pyrophosphate.



RIMMING STEEL—Sodium Fluoride for smoother-surface rimming steel.



COKE BY-PRODUCTS—Sulfuric Acid for making ammonium sulphate; for washing toluene and benzene, and for treating light oils.

Sodium Cyanide—Sodium Fluoride—Sodium Cyanate—Potassium Cyanate, for heat treating and controlling temperature.

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Casting Cleaning Acid (Hydrofluoric Acid)—Sodium Silicate—Zinc Chloride—Chromic Acid • Ammonium Fluoborate—Sodium Fluoborate—Potassium Fluoborate, Anti-oxidants and inhibitors • Potassium Fluoride—Lithium Fluoride and Other Welding Fluxes • Fluoboric Acid: Solvent for silica, in cleaning surfaces.

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For the best Zinc Coating use hot-dip GALVANIZING

LONG LIFE!

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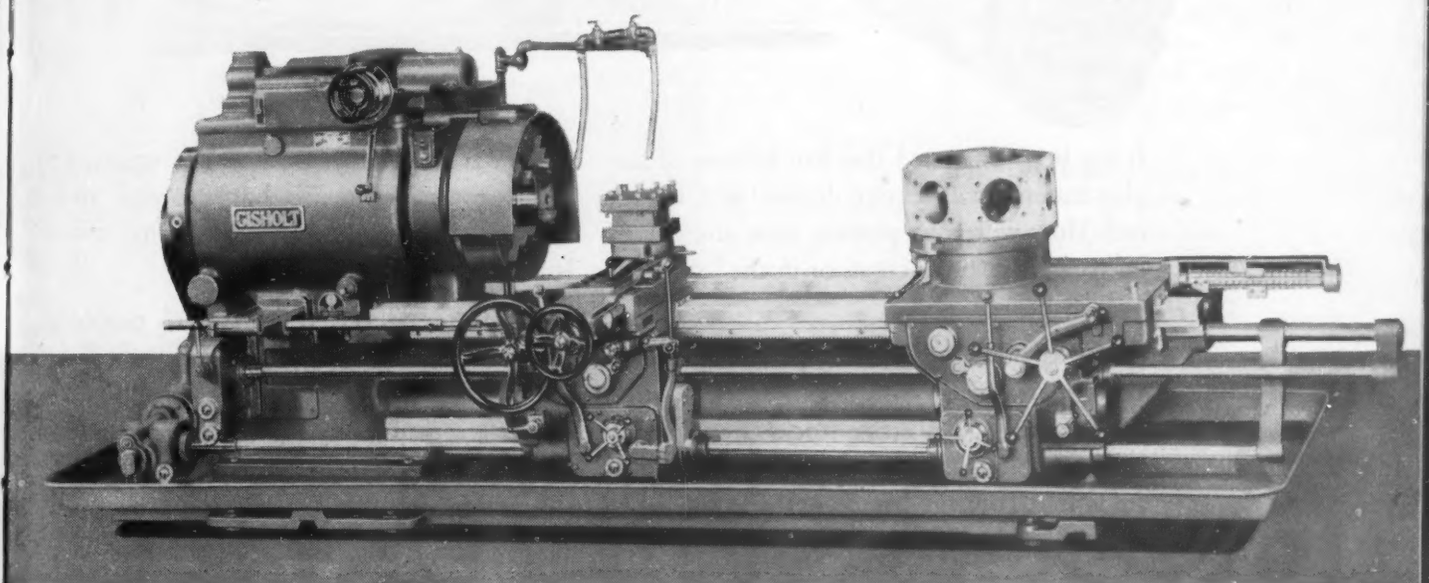
All gears in Gisholt's 12-speed transmission are high carbon alloy steel, precision ground after heat-treatment to assure long wearing quality. All shafts turn on antifriction bearings, with pressure spray lubrication. Headstock is cast integral with bed for extreme rigidity—to maintain accurate, permanent alignment.

2.

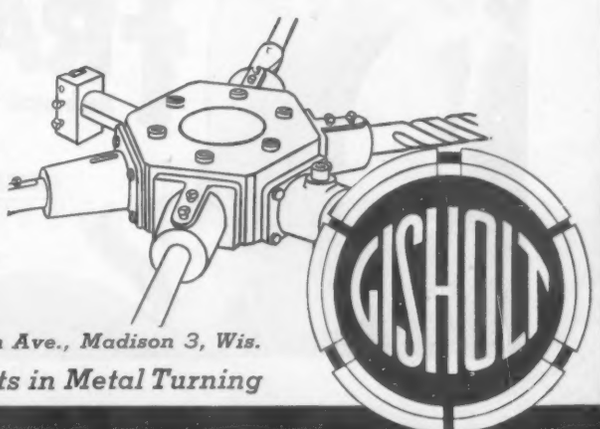
Gisholt's thick, block-type ways are automatically pressure lubricated. Made of SAE 52100 tool steel, they are deep hardened to 64-66 on the Rockwell C Scale and finish-ground in exact alignment with the spindle. On top, bottom and both sides, they present a bearing surface that is virtually wear-proof—assuring accuracy for years to come.

3.

Aprons are fully enclosed, all working parts protected and operating in a continuous cascade oil bath. Alloy steel gears and shafts are mounted on antifriction bearings. Positive serrated feed and traverse clutches cannot slip or bind. Safety shear pins protect feed and traverse mechanism against overload and accident.



● You want speed and easy operation in a turret lathe, of course. And you'll find them in these Gisholts. But you want long life, too, when you invest in a turret lathe. It means lasting accuracy, freedom from repair bills, protection for your investment for years to come. Ask for full information.



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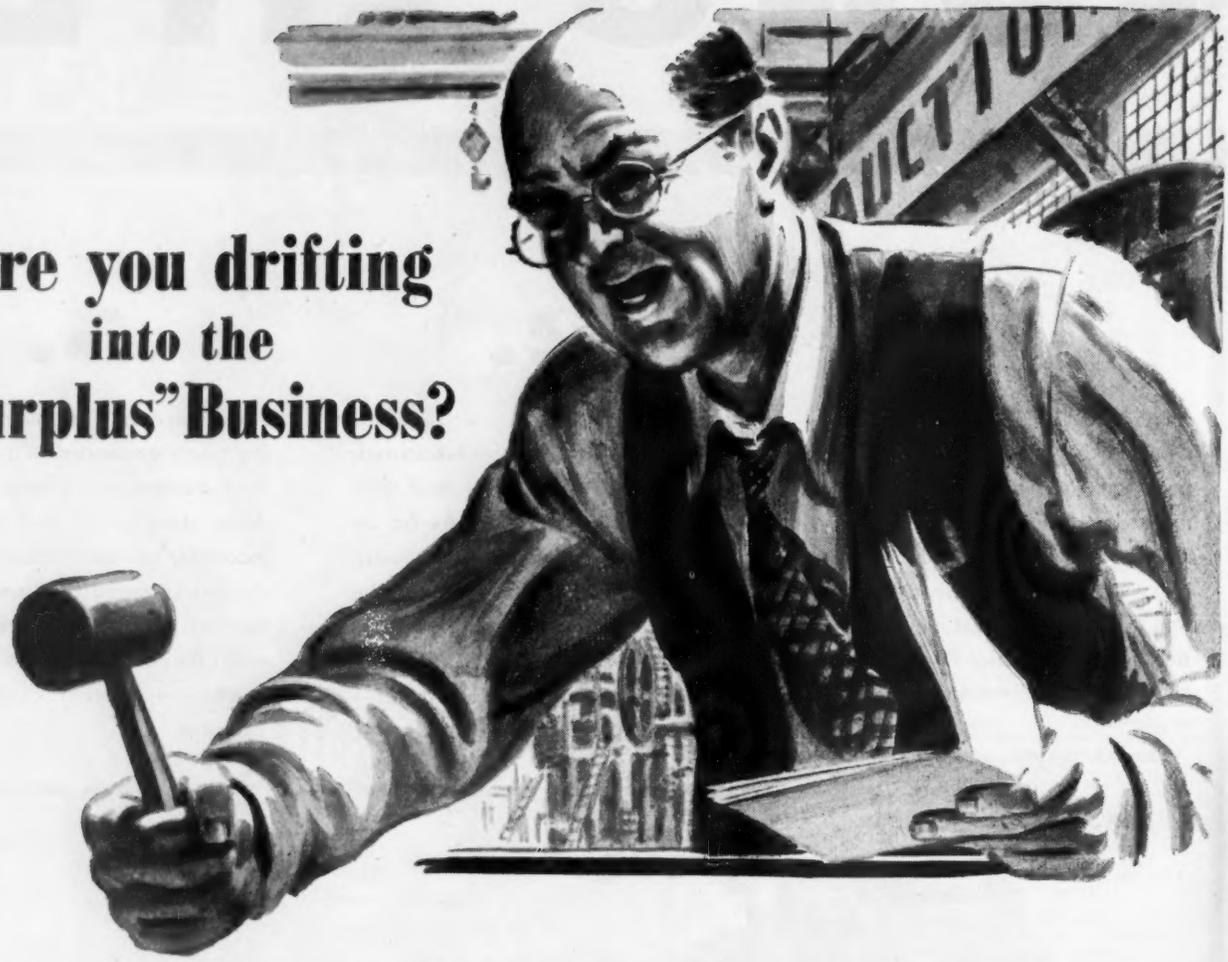
Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

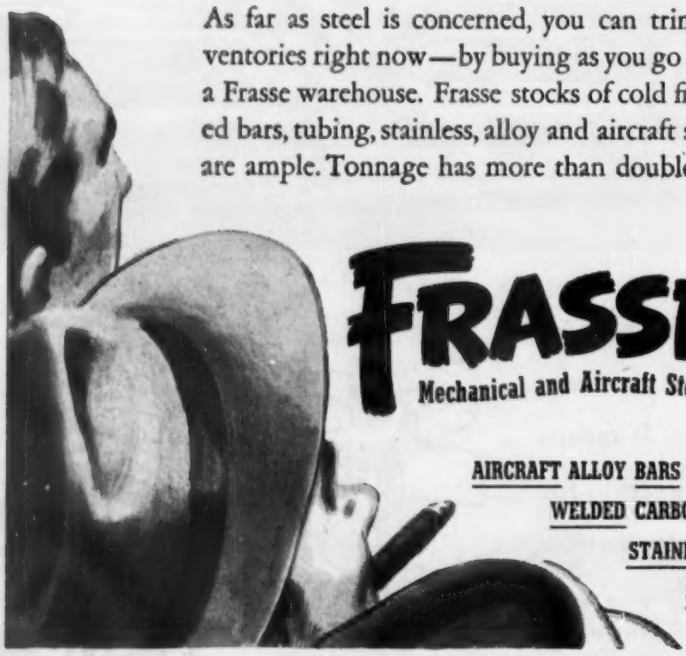
Are you drifting into the "Surplus" Business?



It has been estimated that $20 billions of surplus material will require disposal at the war's end. How will your postwar time and energy be spent — in production, or in the "surplus" business?

As far as steel is concerned, you can trim inventories right now—by buying as you go from a Frasse warehouse. Frasse stocks of cold finished bars, tubing, stainless, alloy and aircraft steels are ample. Tonnage has more than doubled to serve war needs. By using Frasse stocks, you maintain war production, but keep your inventory low — escape dead surplus when cancellations and cutbacks occur.

No need to pile up your "surplus problem" with Frasse steels handy . . . mechanical and aircraft grades in extensive size and shape ranges are readily available. To keep up production . . . keep down the surplus risk . . . call Frasse first.



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"How Much Does It Cost?"

That is a question sales departments are going to ask of production officials.

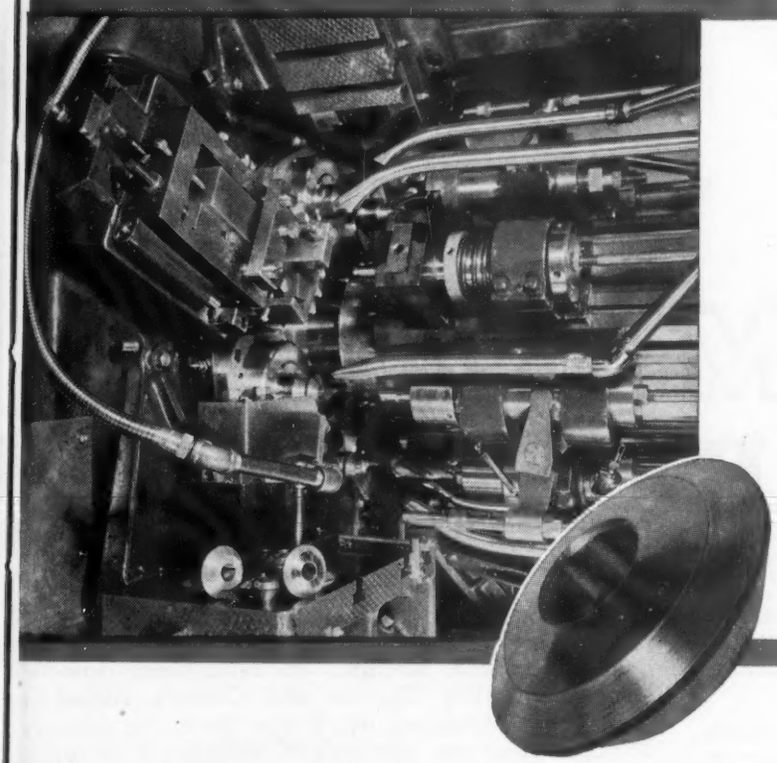
Sales Managers know that volume of business comes through lower selling prices—and lower selling prices come through reduced cost of manufacture.

Acme-Gridley Automatics—Bar and Chucking—turn out precision metal parts in less time. Their cost-cutting ability has been thoroughly established in hundreds of plants, for both war and peace production.

"How much does it cost" is an important question in war. Taxes depend on the answer.

"How much does it cost" is equally important in peace. Sales volume depends on the answer.

We'll be glad to give you more details.



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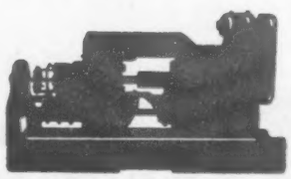
The job—a Differential Pinion Gear Blank, made on a 2⅝" Acme-Gridley Bar Automatic.

Face and hole previously called for 2 grinding operations—requiring extra machine equipment and extra time.

Now burnished on the Acme-Gridley to a better finish than obtained by grinding.

More than 20 tools and attachments combine to produce this piece in half the former time.

On 2 million or more parts, that is a SAVING that runs into money.



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

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It's the proper electrode for welding high-strength, low-alloy steel, including carbon molybdenum pipe and fittings where creep resistance is desired at high temperatures. Also has high impact values down to 50° below zero. Especially recommended for weldments that are not stress-relieved. Weld metal is machinable as deposited or heat-treated. Write today for procedures.

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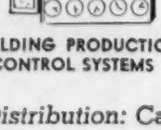
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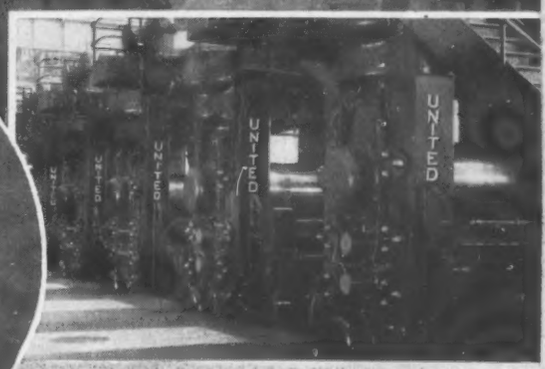
UNITED Hot Strip Mills

Designs For

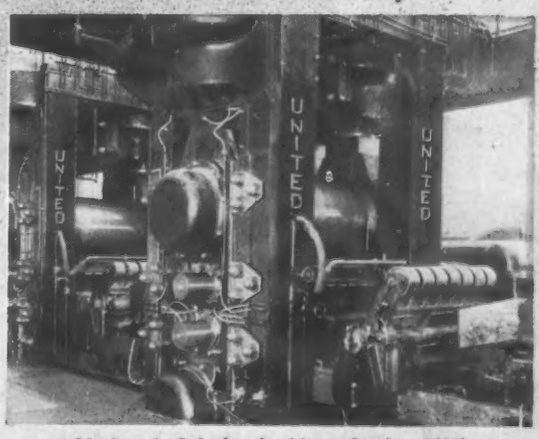
★ 98 inch ★ 66 inch

★ 56 inch ★ 43 inch

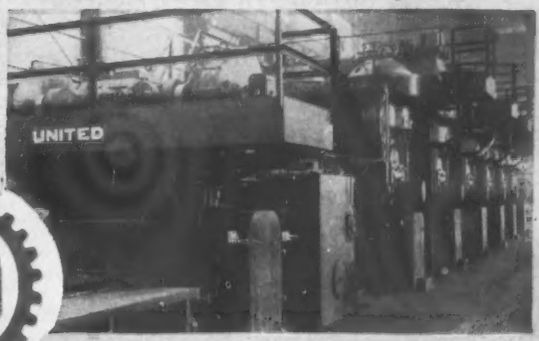
and Intermediate Sizes
Immediately Available



United 66 inch Hot Strip Mill



United 56 inch Hot Strip Mill



United 43 inch Hot Strip Mill

WE have greatly increased our Rolling Mill production facilities to meet war requirements, and very shortly we expect to be able to offer attractive deliveries on units duplicating the above HOT STRIP MILLS, or modifications of them adapted to meet your specific requirements.

Recognized pre-eminence in technical research, and more than 40 years experience in the design, construction and installation of Rolling Mills and their auxiliary equipment for leading steel manufacturers throughout the world, is evidence of UNITED'S ability to serve you.

In planning for present or postwar expansions you should consult with our engineering staff.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

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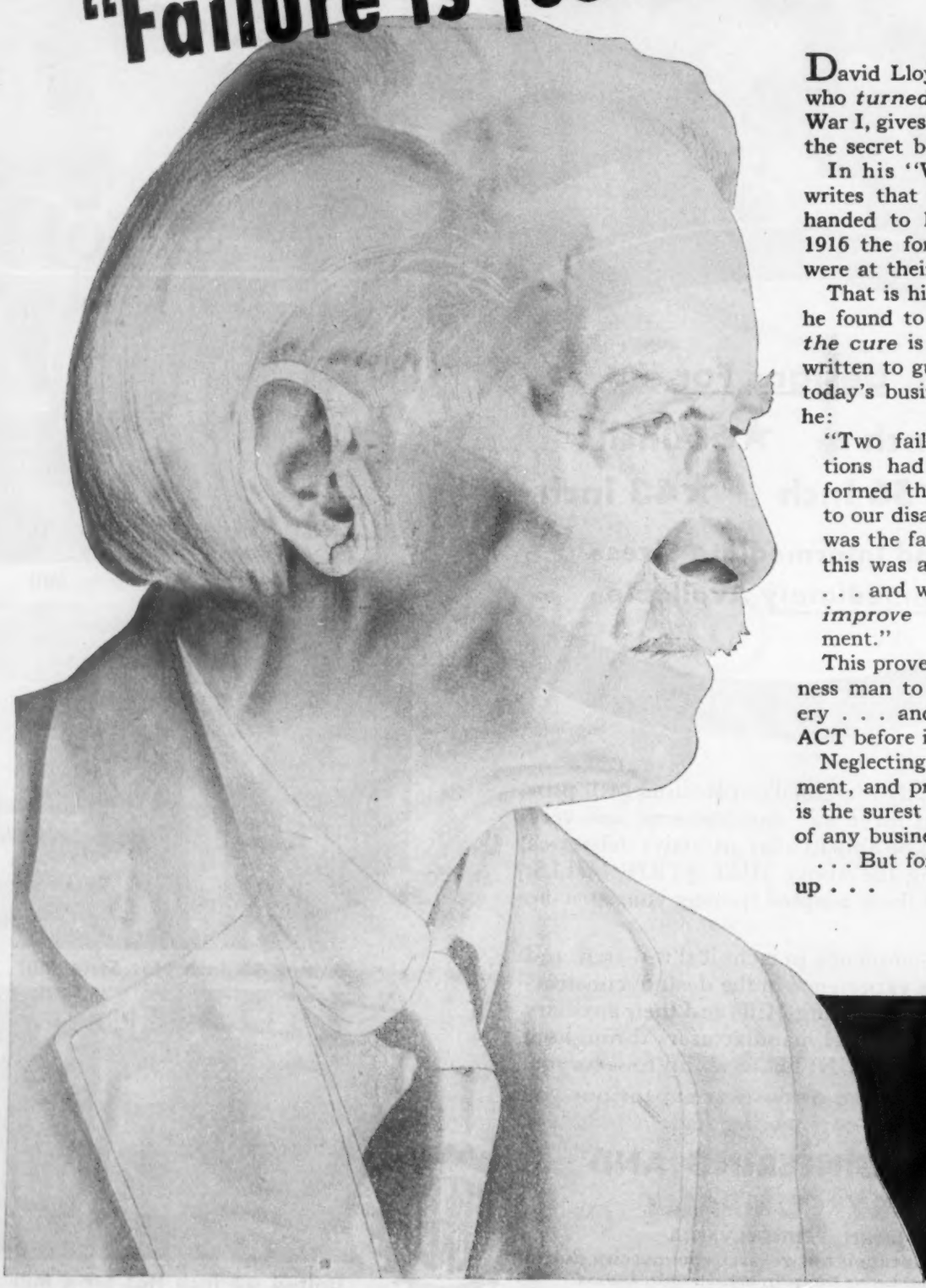
Reg. T. M.

** The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment*

then he said to himself

"Failure is just a symptom"



David Lloyd George, the man who *turned the tide* of World War I, gives to postwar planners the secret behind that turn.

In his "War Memoirs" he writes that when the war was handed to him at the end of 1916 the fortunes of the Allies were at their lowest ebb.

That is history . . . but what he found to be *the cause* and *the cure* is as fresh as though written to guide the strategy of today's business planners. Says he:

> "Two failures on key questions had completely transformed the military position to our disadvantage. The first was the failure to realize that this was a war of machinery . . . and we had neglected to *improve* the Allied equipment."

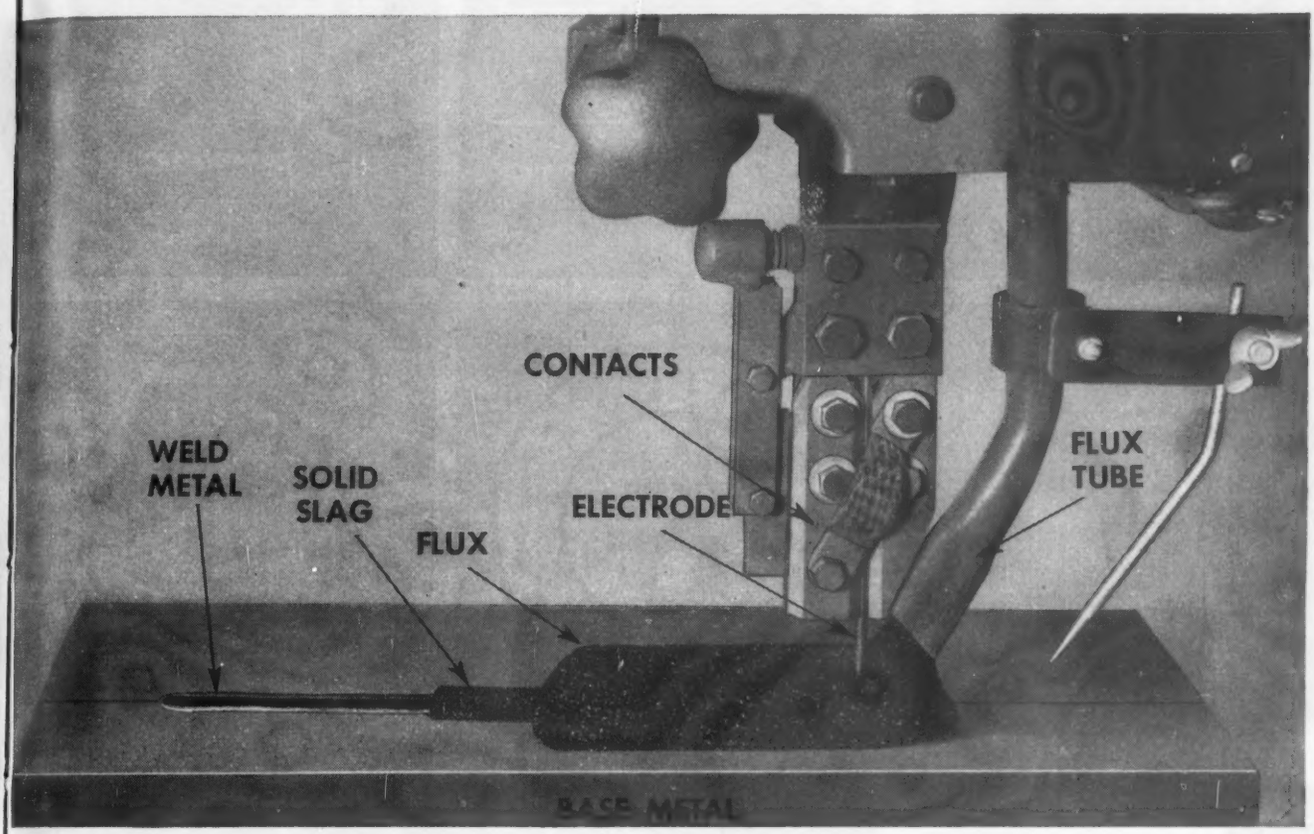
This proves he is a good business man to make that discovery . . . and a better man to ACT before it is too late.

Neglecting to improve equipment, and production, and cost is the surest road to the valley of any business curve.

. . . But for climbing out, and up . . .

"IMPROVEMENT...the key," *he says*

Look, "L. G.", how Lincoln has improved the Shielded Arc Welding Process:



The Pioneer of Shielded Arc Welding Announces "LINCOLNWELD"

. . . key to better welding at lower cost

Shielded completely under a blanket of flux, the arc of "Lincolnweld" brings to the welding world new high standards of *speed, quality* and *economy*. Here are a few of the many advantages of this new Lincoln Automatic Metallic Shielded-Arc Process . . . reported by many users for a wide variety of applications:

VERSATILE. Same flux . . . same electrode . . . same procedure . . . can be used for wide range of steel analyses. With simple change of electrode size, same equipment welds thin sheets or heavy plates.

EASY TO WELD HORIZONTAL FILLETS. Simple to change from butts to fillets or laps. Deep-root penetration combined with high welding speeds assure welds of higher quality at lower cost.

PRODUCES HIGH QUALITY WELDS. "Lincolnweld" Flux gives quality results even in many steels of poor weldability.

ARC CONTROL IS SIMPLE. Balanced voltage type d.c. control . . . highly sensitive yet rugged and dependable.

TAKES WIDE RANGE OF ELECTRODE SIZES. Accommodates ⅛" to 7/32" electrode without change in head or control.

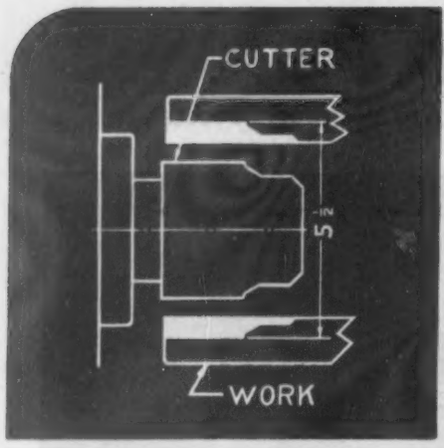
NOT SENSITIVE TO POWER LINE VOLTAGE VARIATIONS. Assures weld uniformity at all hours of day or night even though there may be voltage variations in shop power.

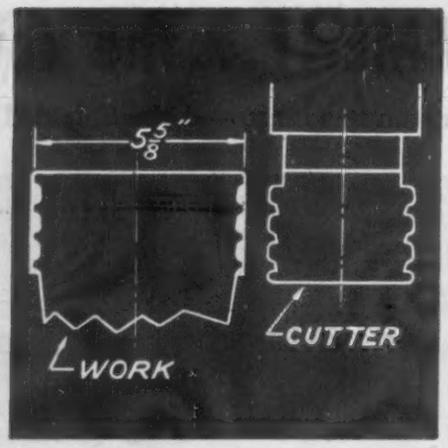
A booklet has been compiled giving "Lincolnweld" facts, procedures and results in a variety of applications. A free copy is yours for the asking.

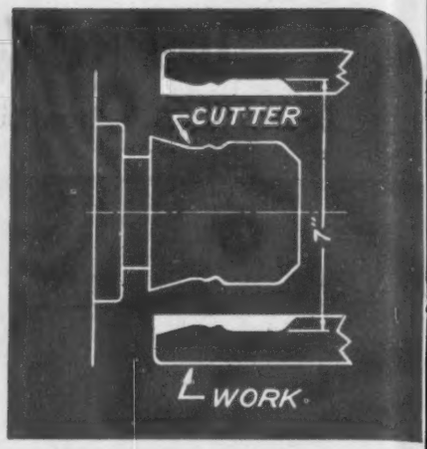
THE LINCOLN ELECTRIC COMPANY • DEPT. L-1 • CLEVELAND 1, OHIO

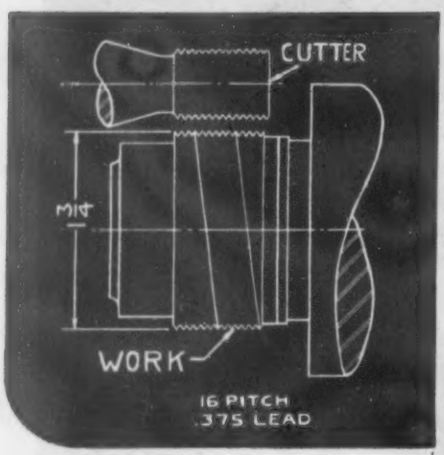
America's greatest natural **recourse**

ARC WELDING









For Victory Today—Prosperity Tomorrow—

LOOK TO PLAN-O-MILL

For exceptional speed, accuracy and finish—at a saving of money, metal and manpower—look to Plan-O-Mill!

Plan-O-Mill provides a *better* method of form and thread milling. Plan-O-Mill offers outstanding rapid-production features, including General Electric's Thy-mo-trol for separate and complete control of feed-in and feed-around. Plan-O-Mill requires a minimum of skill to operate, a minimum of operator attention.

Shown above are typical examples of Plan-O-Mill production applications. If your war or post-war products involve internal or external threading or cylindrical forming, replace obsolete, wasteful machines with Plan-O-Mill. Contact your machinery dealer or write direct.

First

PLAN-O-MI

FIRST to install General Electric's remarkable new Thy-mo-trol—electronic feed control!

FIRST planetary to mill external threads with standard multiple thread cutter!

FIRST planetary to coordinate feeds and speeds!

FIRST to provide absolute control of fe

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD • HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-ED MILLING CUTTERS

In Thousands of *WAR PLANTS*

GATES *Synthetic Rubber* V-Belts

—are giving *BETTER SERVICE*

Than Any V-Belts Ever Made of NATURAL RUBBER!

To meet the unprecedented severity of combat service on U. S. Army tanks, tractors and self-propelled big guns, Gates has developed and built synthetic rubber V-belts to far higher service standards than were ever required of pre-war, natural rubber V-belts!

- **The importance of this fact to industrial V-belt users is this:**

  Every improvement developed by Gates for these Army V-belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

In the case of many other products, you must wait until after the war to get the benefit of war-time improvements. But victory depends upon production—and production depends upon V-belts which drive the producing machines. That is why Gates has been able to pass on to you immediately, in your Standard Gates Vulco Ropes, every V-belt improvement which Gates specialized research has developed for use in the Army's motorized equipment.

In addition, where V-belts of special construction are required your Gates Rubber Engineer can supply a Gates V-belt that is precisely engineered to meet your special needs. Whenever you have a drive problem or a V-belt problem, just pick up your telephone directory and look under the heading "Gates Rubber." The Gates Rubber Engineer will bring right into your plant the full benefits of every advance in V-belt construction that Gates specialized research has developed.

—and one of these 5 GATES V-belts will meet any Special need you may have.

- Rayon Cord V-Belts
- Static-Safety V-Belts
- *Special* Synthetic V-Belts
- Cotton Cord V-Belts
- Steel Cable V-Belts

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

Gates

The Mark of Specialized Research

454

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL. 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue ATLANTA 3, GA., 738 C. & S. National Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway DETROIT 4, MICH., 8663 Grand River Ave.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL. 1090 Bryant St.

CLEVELAND STRAIGHT-SIDED DOUBLE CRANK PRESS • •

Cleveland Straight Sided Double Crank Presses can be furnished in a very wide range of sizes and capacities and with stroke, adjustment, die space, etc. to suit particular requirements.

The more general application of these Presses is in the manufacture of light and heavy sheet iron and steel products and they can be used advantageously for punching, forming, stamping, bending, cutting and light embossing of large and irregular shapes.

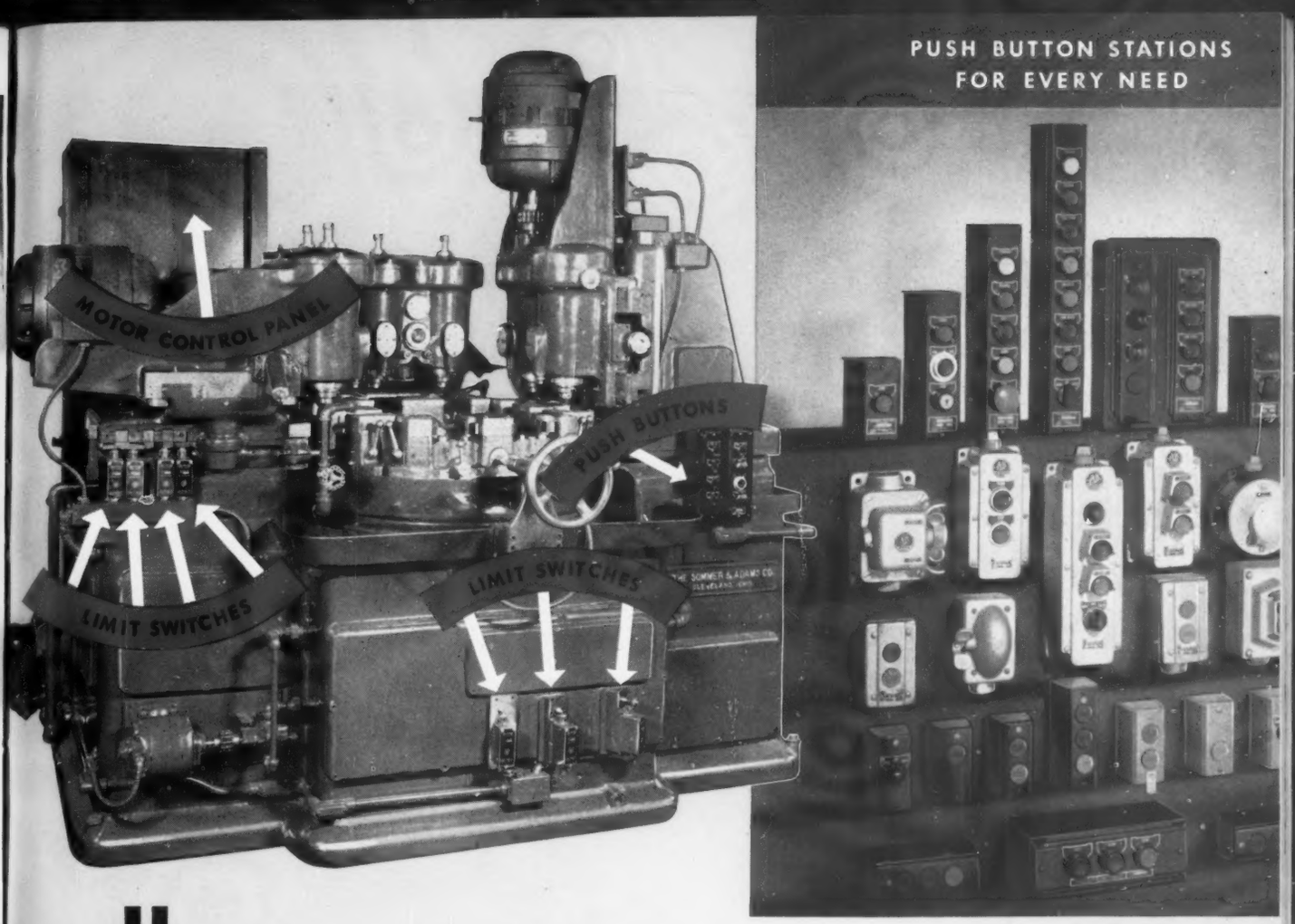
On very wide or long stroke Presses, or when the work is particularly heavy, twin drive, as shown in the illustration, is recommended.

• • 70-D-54—Straight Sided Double Crank Press equipped with electrically controlled air friction clutch—twin drive, air counterbalance, air cushion in bed. The Press has a stroke of 10", adjustment 4", bed area 40" x 54" and a capacity of 180 tons.

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY

Cleveland 14, Ohio

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH



PUSH BUTTON STATIONS
FOR EVERY NEED

Here's an easy way to solve your sequence control problems

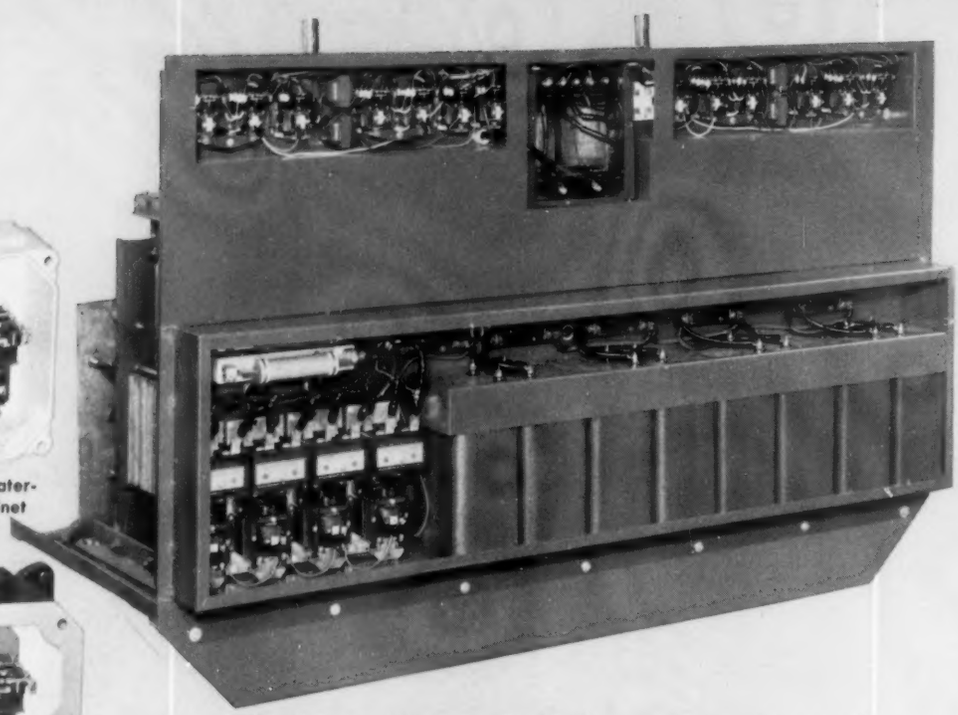
LIMIT SWITCHES
FOR SEQUENCE OPERATIONS

The Sommer & Adams 3-spindle milling machine, illustrated above, shows what an alert machine tool designer can do to solve his *special* sequence control requirements with *standard* Allen-Bradley controls.

A special Allen-Bradley control panel, made of standard contactors and relays, is mounted on the back of the above milling machine. Standard limit switches and master push button stations, all interconnected with the main contactor panel, provide for the desired automatic sequence control. That's all there is to it. No costly development work—no delay.

When you have an Allen-Bradley control catalog in front of you, it is easy to hook up any combination of sequence operations. Our engineers are always available to help you, too. Why not send for Allen-Bradley bulletins on machine tool controls, today.

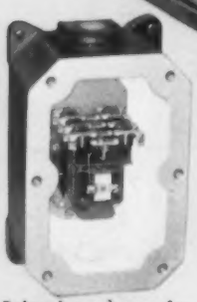
ALLEN-BRADLEY
AUTOMATIC MOTOR CONTROLS
QUALITY



SEVENTEEN A-B RELAYS AND CONTACTORS
on Transformer Type A. C. Welder

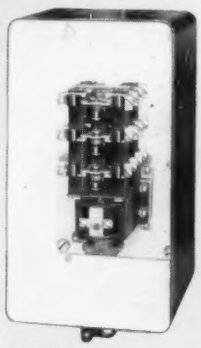
Courtesy Glen Richards Company, Oakland, Cal.

Relay in water-tight cabinet



Relay in enclosure for explosive atmospheres

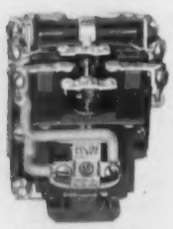
Relay in general purpose enclosure



12-Pole relay in general purpose enclosure

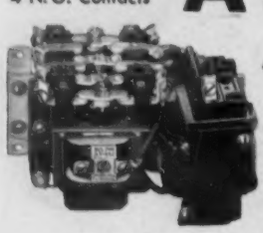
RELAYS

800 STANDARD TYPES...TO FIT YOUR SPECIAL NEEDS



Thermostat Relay 2 N. O. Contacts

Machine Tool Relay 4 N. O. Contacts



Transformer-Type Relay 2 N.O. and 2 N.C. Contacts

Allen-Bradley relays are designed to electric motor control standards with adequate electrical clearances. They are ruggedly constructed ... and good for millions of trouble-free operations. Only a few of the hundreds of standard Allen-Bradley units are shown on this page. The combinations of contacts, circuits, and enclosures are so extensive that you can easily find a standard relay that will exactly fit your requirements.

Bulletin 700-200 on AC-DC relays is a valuable encyclopedia on relay applications. We will gladly mail a copy on request.

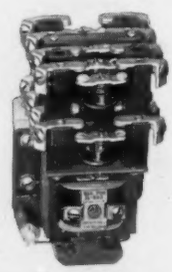
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

A-B Quality

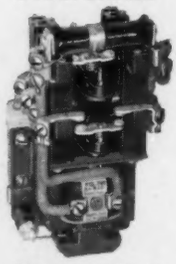
ALLEN-BRADLEY

A-C D-C RELAYS AND CONTACTORS

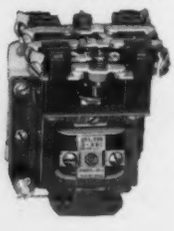
QUALITY



Machine Tool Relay 8 N. O. Contacts



Thermostat Relay 4 N. O. Contacts



Machine Tool Relay 2 N.O. and 2 N.C. Contacts

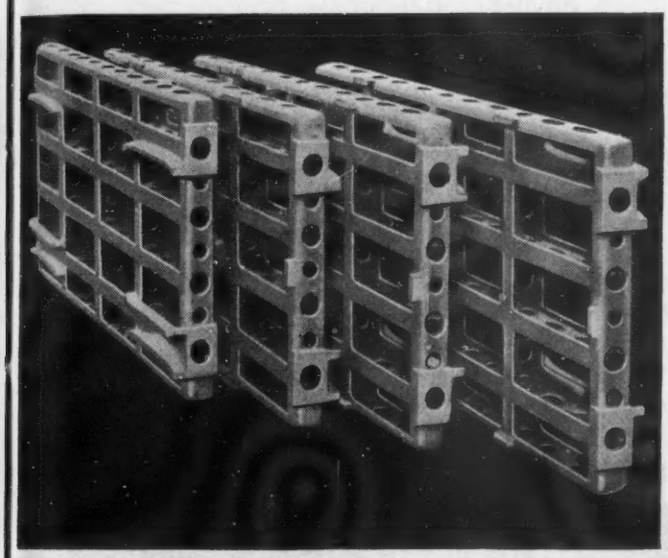
HEAT-RESISTANT ALLOYS

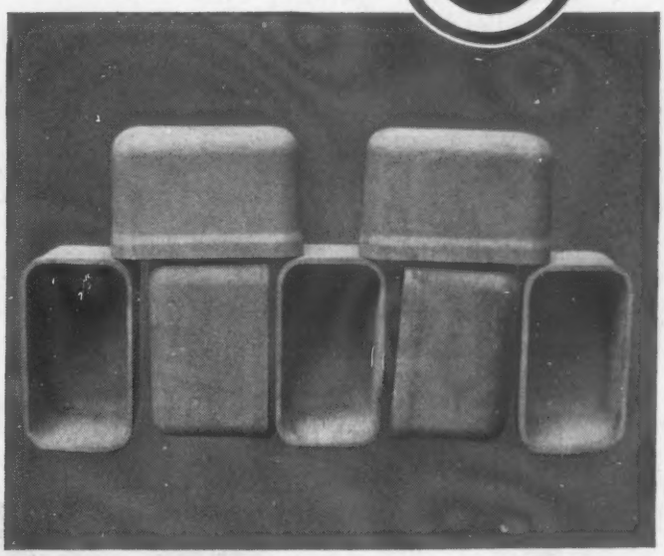
The making of a modern casting begins with study of the uses for which it is designed. What are the varied conditions of heat and corrosion to which it will be subjected? What stresses must it withstand? Knowledge and experience, records of research and tests — all these go into the composition of a Midvale casting.

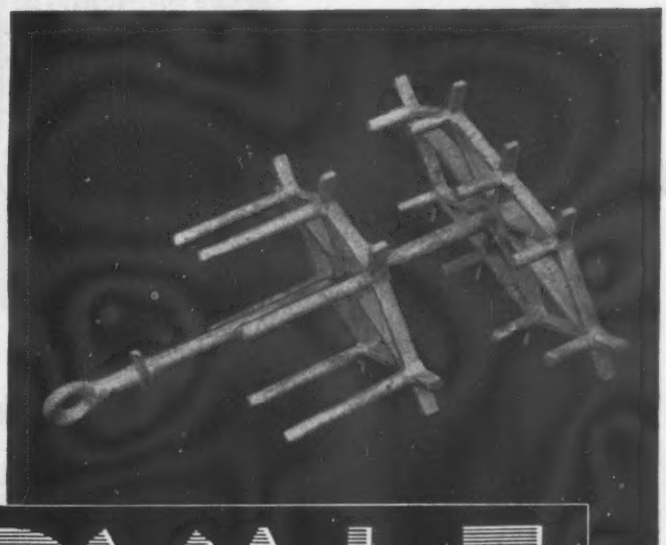
Midvale, compounding alloys successfully since 1867, has an experience file which embraces virtually every modern alloy developed either here or abroad.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO







MIDVALE
Custom Steel Makers to Industry

Snyder Special TAPS 61 HOLES IN AIRCRAFT PART

Tapping 61 holes of various diameters and in various positions on a large aircraft housing is the job for which Snyder designed and built this automatic-cycle special-purpose machine.

When the starting button is pressed, slide and part automatically move left to the first work station where a large vertical multiple spindle tapping head and several horizontal and angular tapping units go through their automatic cycle operation.

Slide and part then automatically move right to the second work station where another group of vertical, horizontal and angular tapping spindles automatically go through their operating cycle. All tapping spindles have individual lead screws.

Some of these tapping units are installed on hydraulically operated sub-slides to provide rapid advance of the unit before lead screw tapping. For example, the vertical head in the left hand station has a large group of spindles on the periphery which has no hydraulic advance. However, a cluster of spindles in the center of the head is automatically advanced into tapping position several inches lower than the outer spindles.

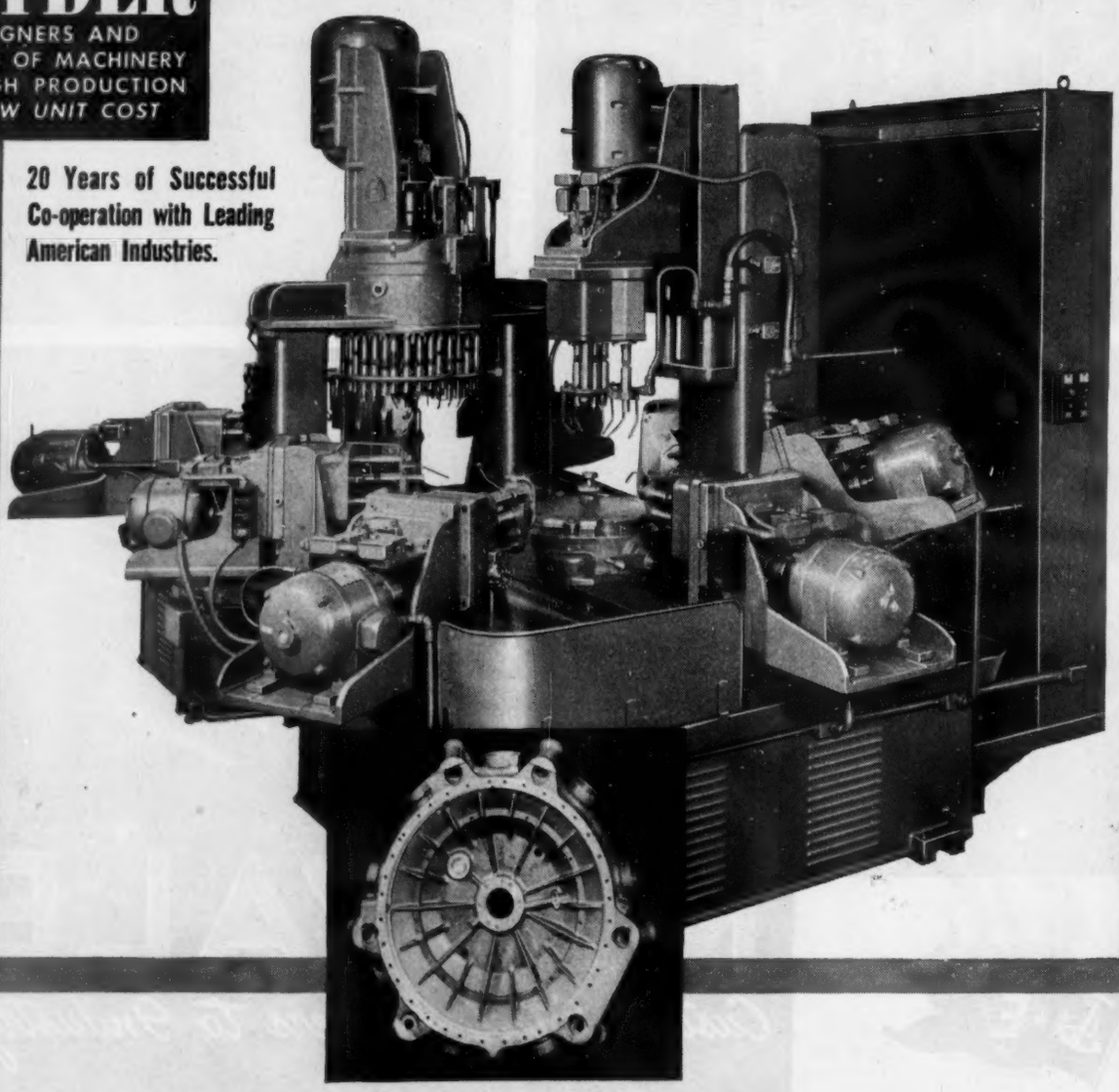
Master control is near loading position and each tapping unit has individual push button station for set-up purposes. Machine base is welded steel.

If your present or prospective operations can benefit from establishing complete control of production speed, accuracy and finish, Snyder special-purpose machine may be the answer. We invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette, Detroit 7, Michigan.*

SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries.



"Get your scrap and ingots ready . . . Plymouth Will Haul 'em . . . and keep doing it". . .

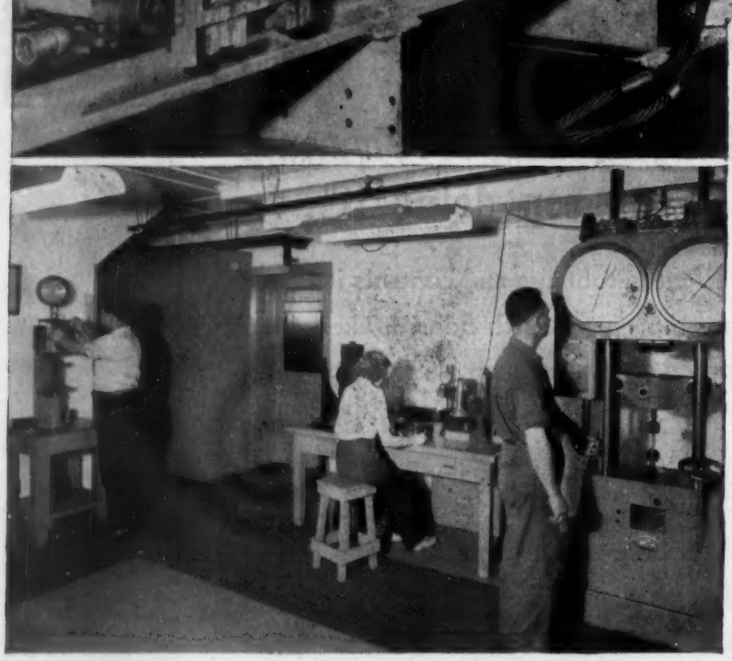
No rushing the "hi-line" . . . lifts the tonnage and controls it at any speed, especially in going onto the open hearth floor. Makes safer, easier coupling . . . faster stopping and starting on stock house scales . . . highest clearance above rails—a definite advantage in the stock-house.

Tough? Six months . . . 'round the clock every day, and only THREE hours out during the whole time for repairs, other than refueling and lubrication. Isn't that what you want on the open hearth? That's the record of one of these babies. Write for complete information.

PLYMOUTH GASOLINE and DIESEL LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS

Division of The Fate-Root-Heath Co. PLYMOUTH, OHIO, U. S. A.



Above: Hydrostatic testing machine checking a propeller shaft sleeve. Below: Intensive laboratory research and testing at Shenango-Penn assures rigid control and progressive development.

CENTRIFUGAL CASTINGS BY SHENANGO-PENN

THE propeller shaft sleeve shown above on test is one of thousands cast and machined by Shenango-Penn for the Navy and Maritime Commission. Other tubular parts commonly cast and finished by Shenango-Penn include bearings, bushings, rings, sleeves, liners, rolls and many additional parts for engines, machines and equipment of various types.

Time and again these parts have demonstrated their outstanding quality, their soundness and all-around superiority. It's not surprising when you consider that Shenango-Penn's centrifugal casting process provides greater density, more uniform grain structure, higher tensile strength, better elongation, no sand inclusions, no blowholes and less porosity. Such castings are better able to withstand shock and pressure . . . will wear longer . . . will hold up where other castings would be sure to fail.

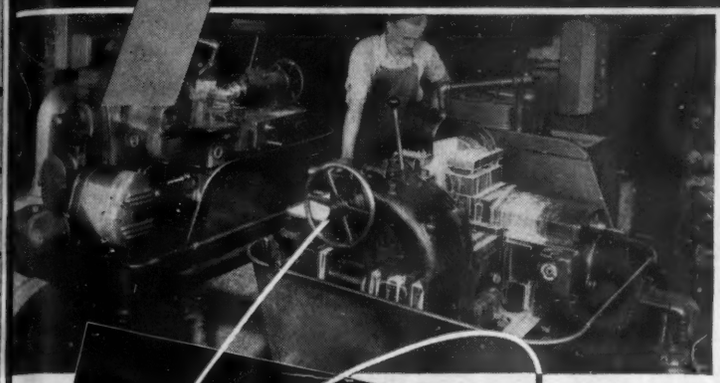
Write for Bulletin 143 containing alloy specifications, physical and chemical properties, size, applications and other descriptive data.

SHENANGO-PENN MOLD COMPANY
454 West Third Street • DOVER, OHIO
Executive Offices: Pittsburgh, Pa.

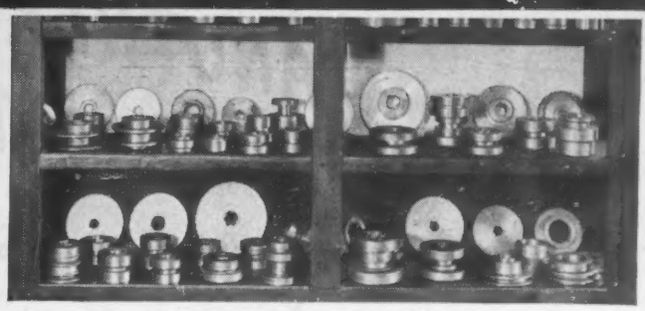
SHENANGO-PENN

ALL BRONZES • MONEL METAL • ALLOY IRONS

timely Questions on turning problems



AND THEIR ANSWERS



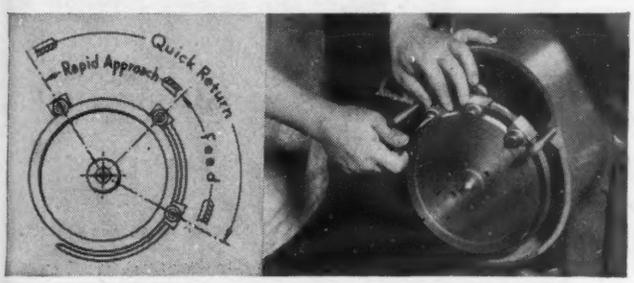
Master samples used for tooling setups.

It's no longer necessary to single point turn or use other slow methods on short-run turning jobs. Many manufacturers are now getting the advantages of multiple tooling on short-run, as well as on mass production turning . . . *with automatic lathes.*

Following are a few important questions we have encountered while presenting the Sundstrand Automatic Lathe for short-run turning. Perhaps the answers will give you some helpful ideas on your present problems.

Q *What is the basic difference between an automatic lathe that can handle short-run work and one that can't?*

A On a Sundstrand it's the quick cycle change feature. Adjustments for various types and sizes of work can be made rapidly with a minimum of down time of the machine.



Cycle control disc for quick changeovers.

Q *Is there any difference between processing short-run and mass production work over an automatic lathe?*

A Very little. On a Sundstrand, the time saving features can be used to advantage by processing work of the same width first. Master samples for use in set-ups are also time savers.

Q *Is the type of short-run work that can be turned on an automatic lathe limited in any way?*

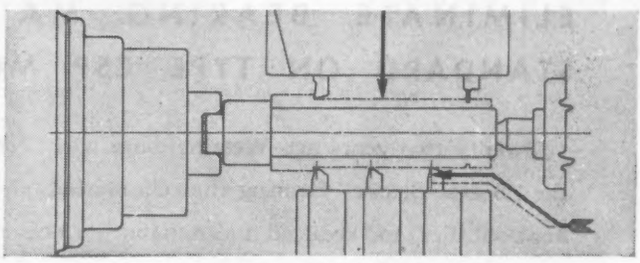
A Yes, but there is such a wide assortment that the Sundstrand has found profitable application in countless metal working plants.

Q *What is the smallest lot size that can be handled profitably on a Sundstrand lathe?*

A It varies and depends upon the number of cuts required and the design of the workpiece.

Q *How long does it take to set up an automatic lathe?*

A This varies with the number of tools needed and the design of the workpiece. The simplicity of the cycle changeover on the Sundstrand makes it possible to set up some jobs in thirty minutes or less.



Tooling for rough turning sleeves.

Q *How can we determine whether or not a Sundstrand lathe will be a profitable addition to our lathe department?*

A Sundstrand engineers will be glad to make an analysis of all of your turning jobs and give their recommendations as to whether new lathe equipment, of any kind, would be a wise investment. Their wide experience may prove helpful to you and there is no obligation for this service.

Q *Where can we get complete up-to-date information on how to increase production with an automatic lathe?*

A *Additional Information* on turning short-run, mass production and special turning jobs is contained in this free booklet. On-the-job illustrations as well as tooling diagrams and factual performance data are included to illustrate the time saving possibilities on turning work such as yours. Write for book 735

ARMY E NAVY

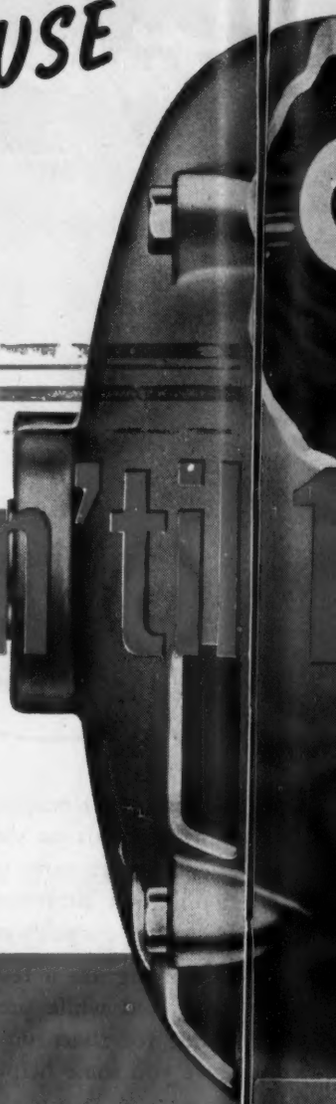
SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

SUNDSTRAND
MACHINE TOOL COMPANY

2540 Eleventh St. • Rockford, Ill., U. S. A.

FUEL UNITS • HYDRAULIC PUMPS • TRANSMISSIONS • FLUID MOTORS • VALVES and CONTROLS

ANOTHER WESTINGHOUSE MOTOR "FIRST"



"No Lubrication" til

PRELUBRICATED BALL BEARINGS PRACTICALLY ELIMINATE BEARING MAINTENANCE...NOW STANDARD ON TYPE CSP MOTORS UP TO 3 HP

Twenty-two years ago Westinghouse was "first" with the "Sealed-Sleeve" Bearing that eliminated oil leakage, kept out dirt, and reduced maintenance on sleeve bearing motors. Today Westinghouse offers the first self-sealed, prelubricated ball bearing that eliminates lubrication for five years. Type CSP prelubricated motors bought now will need no lubrication until 1950.

Prelubricated bearings in Westinghouse motors have been thoroughly field-tested in thousands of Westinghouse lint-free textile motors. Recently a series of bearings was chosen at random and inspected from a group of 600 motors, the first of which were installed between six and seven years ago. All were in perfect condition—even though they had been in operation 24 hours a day and had never been lubricated.

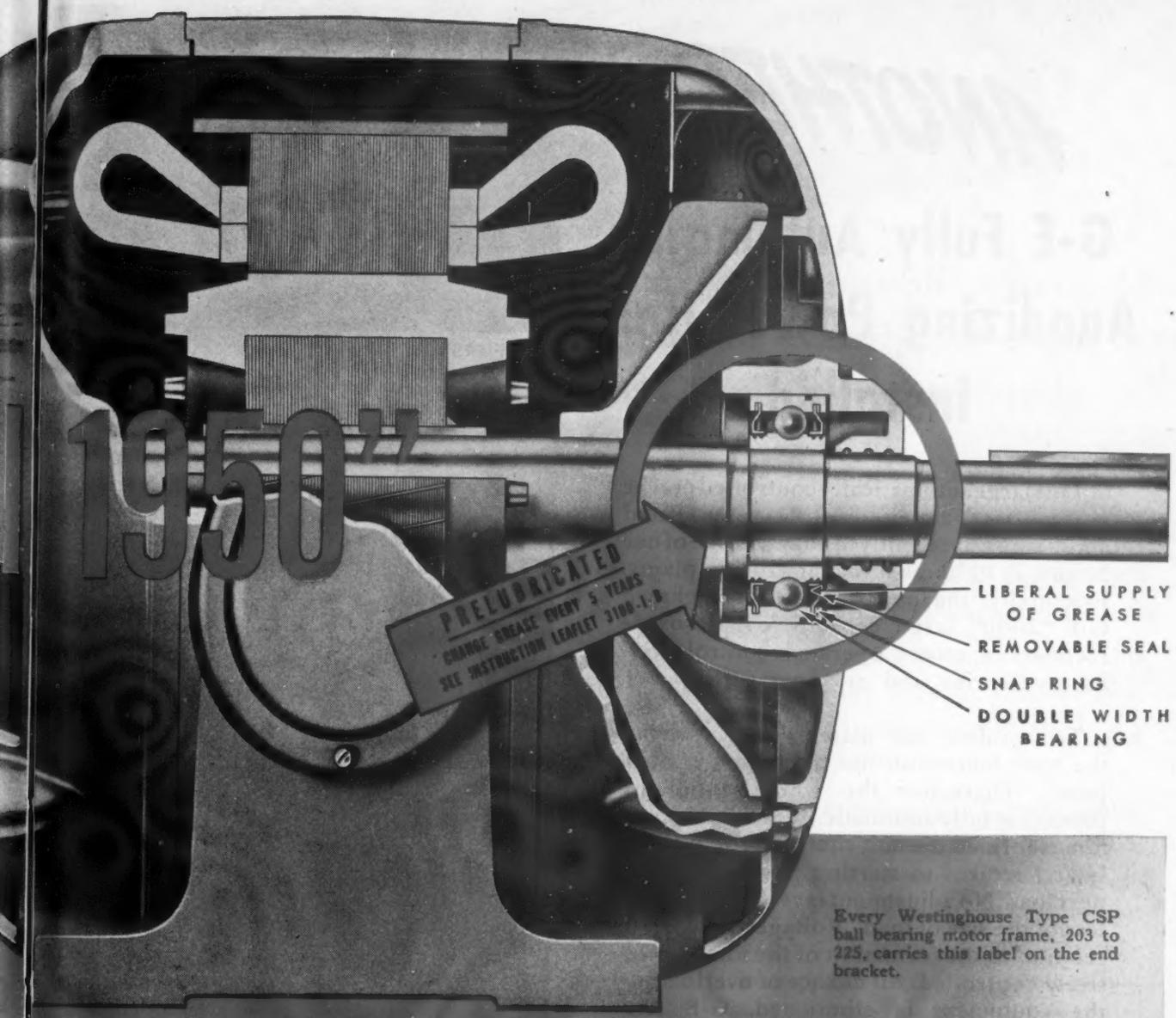
Time-tested special applications such as these have often paved the way for improvements in standard motors. Type CSP motors incorporate the fruits of wide Westinghouse motor application experience. When you buy a Westinghouse Type CSP motor, you get all the latest improvements. For complete information, write for DB 3100-CSP, Westinghouse Electric & Mfg. Co., P.O. Box 868, Pittsburgh 30, Pennsylvania. J-21318

ADVANTAGES

OF WESTINGHOUSE TYPE CSP MOTORS

- PRELUBRICATED SEALED BALL BEARINGS reduce lubrication maintenance . . . assure longer grease life.
- IMPROVED TUFFERNELL INSULATION.
- DYNAMICALLY-BALANCED ROTOR.
- DIE-CAST ROTOR with oversize fan.
- LIBERAL THROUGH-VENTILATION—air enters front, leaves at drive-end of motor.

WESTINGHOUSE



Every Westinghouse Type CSP ball bearing motor frame, 203 to 225, carries this label on the end bracket.

Westinghouse

PRELUBRICATED SEALED BEARING CONSTRUCTION ...retains original grease packing within the stationary seal discs. Bearing chamber accommodates grease sufficient for more than five years of severe service. Held by snap rings, seal discs fit closely over inner race, forming an efficient seal. Snap rings and discs are easily removed to permit packing new grease in bearings.

TYPE CSP MOTORS

ANOTHER

G-E Fully Automatic Anodizing Power Unit Installed

This large automatically controlled power unit for 5000-ampere 40-volt chromic acid anodizing was recently installed in one of our largest B-29 bomber manufacturing plants. Essentially, the unit consists of eighteen G-E "2000" large capacity copper-oxide rectifiers, a motor operated control with its accessories and an operator's panel.

To anodize, the plater simply presses the start button on the operator's control panel. Thereafter the whole anodizing process is fully automatic. When the anodic film is formed the unit shuts off automatically and returns to starting position for the next load. No adjustment is required regardless of the size of load. Voltage build-up in relation to the formation of the film is positively controlled. All chance of overloading the equipment is eliminated. G-E fully automatic power equipment completes the anodizing in the shortest possible time.

For modern anodizing needs, select your power equipment from the G-E line. There are many different rated units from which to choose. Detailed data on request from Section A455-90, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn. Write today.

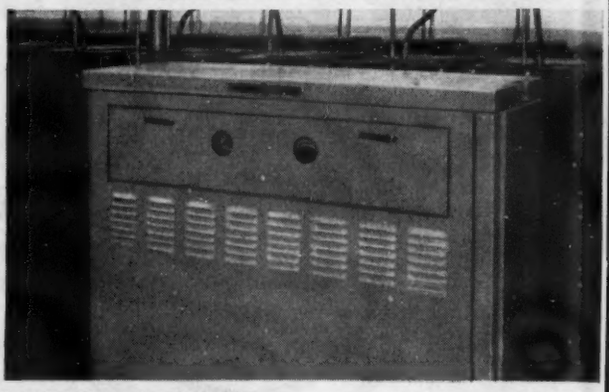
Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news Monday through Friday 6:45 P.M. EWT, CBS. "The G-E House-party" Monday through Friday 4:00 P.M. EWT, CBS.

BUY WAR BONDS AND KEEP THEM

GENERAL ELECTRIC

RECTIFIERS

Eighteen G-E "2000" Copper-oxide rectifiers connected in parallel provide output of 5000 amperes 40-volts d-c.

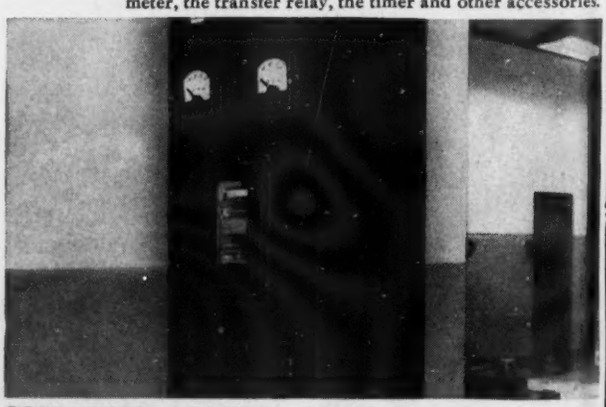


RECTIFIER CONTROL

Fully automatic, easy to use, reduces labor costs. Eliminates "human element" factor and leaves nothing to chance.

RECTIFIER CONTROL ACCESSORIES

Open view of control showing the contact-making voltmeter, the transfer relay, the timer and other accessories.

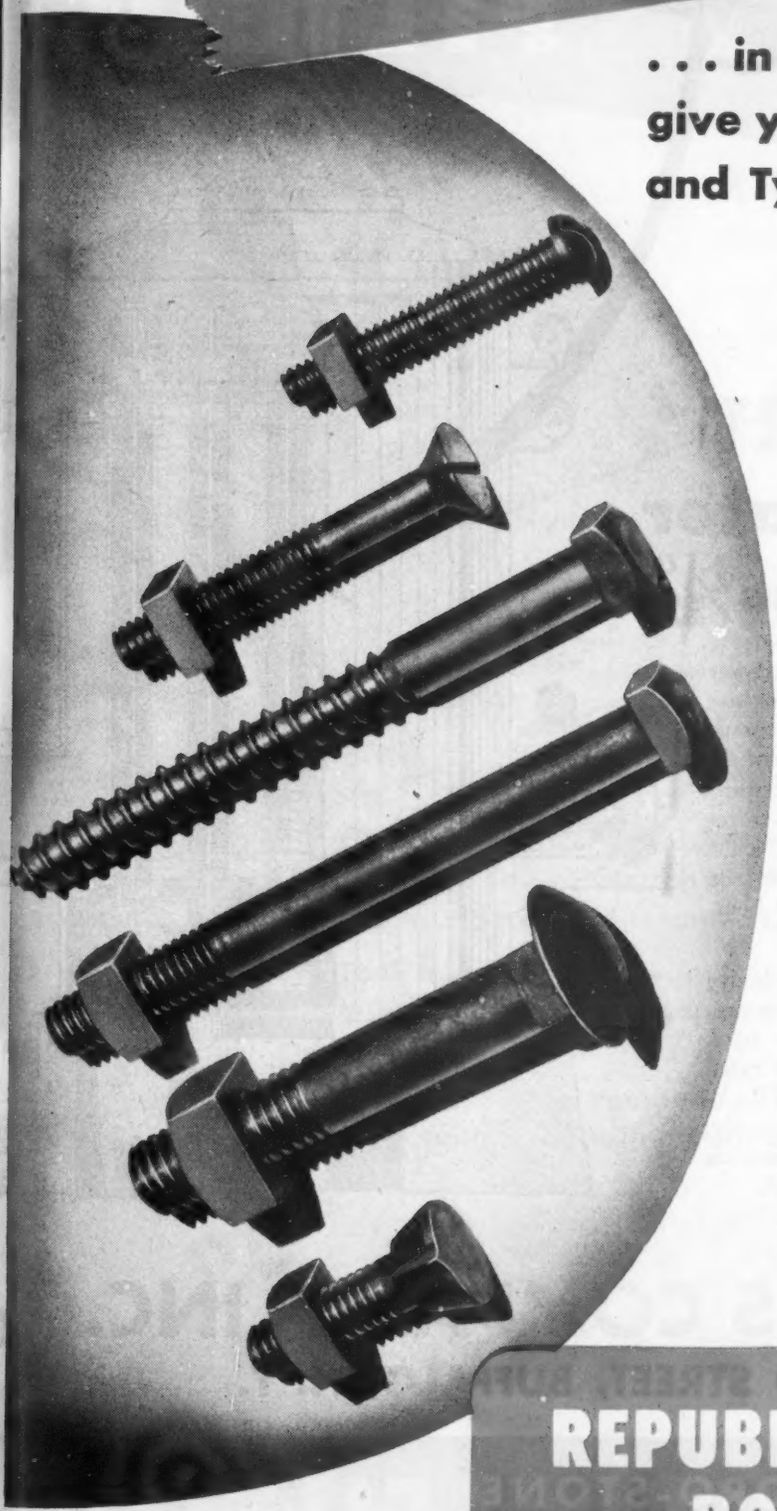


OPERATOR'S CONTROL PANEL

Located near the tanks for operator's convenience is complete with start-stop push buttons, indicating instruments, recording voltmeter, etc.

(Photographs courtesy of LaSalco Inc.)

These and 19,994 others



. . . in the Republic Upson Line give you exactly the Right Size and Type for your needs

• If we sent you a different type and size of Republic Upson product each day, it would be over 50 years before you'd see the same one twice. That's how extensive the Line really is.

Quantity is not the only remarkable feature of the Republic Upson line of headed and threaded products. It is a leader in *quality* too.

For 90 years Republic Upson Quality has always meant sharp-cornered, straight-sided, wrench-fit heads—tough, accurately-gauged shanks—strong, clean-cut, precision-formed threads. These qualities mean perfect nut to bolt fit, quick assembly, tight gripping, no wrench slippage, less spoilage.

Here's one line for practically all fastening needs. Standardize on it for better postwar bolt and nut service.

REPUBLIC STEEL CORPORATION
BOLT AND NUT DIVISION • CLEVELAND 13, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC *Upson Quality*
BOLTS AND NUTS

Other Republic Products Include Pipe, Sheets, Tubing, Hot Rolled and Cold Drawn Bars—Carbon, Alloy and Enduro Stainless Steels

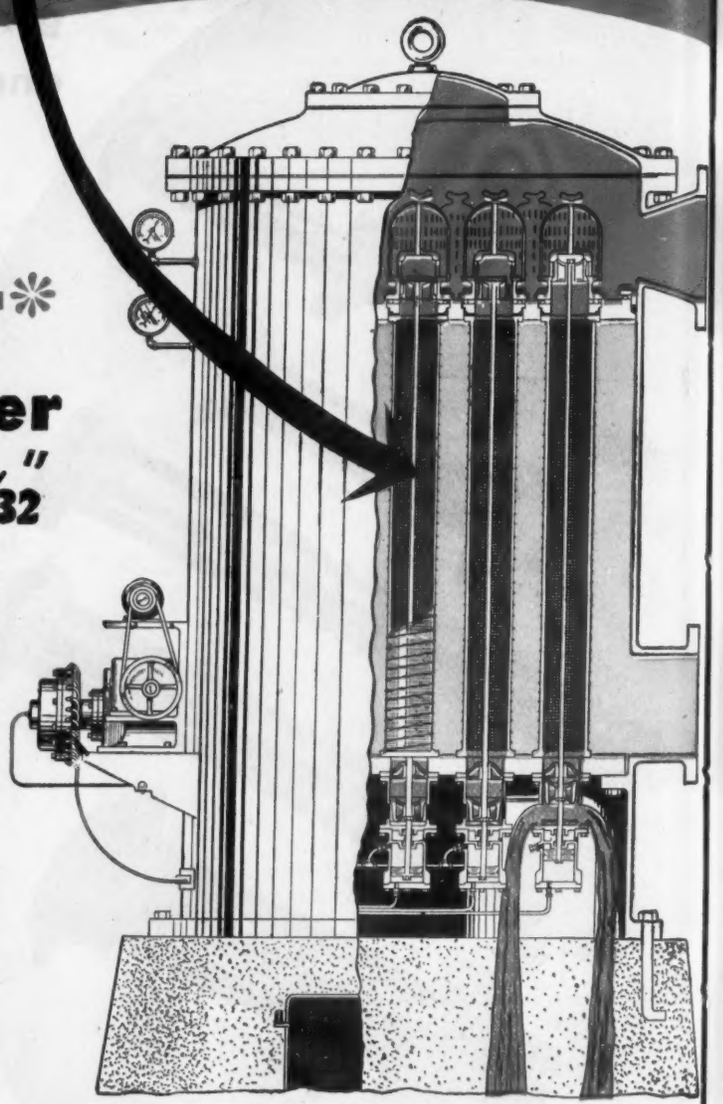
ADAMS AUTOMATIC WATER FILTERS

Remove GRIT and DIRT* from River Water

***15 times finer than 1/32"**

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



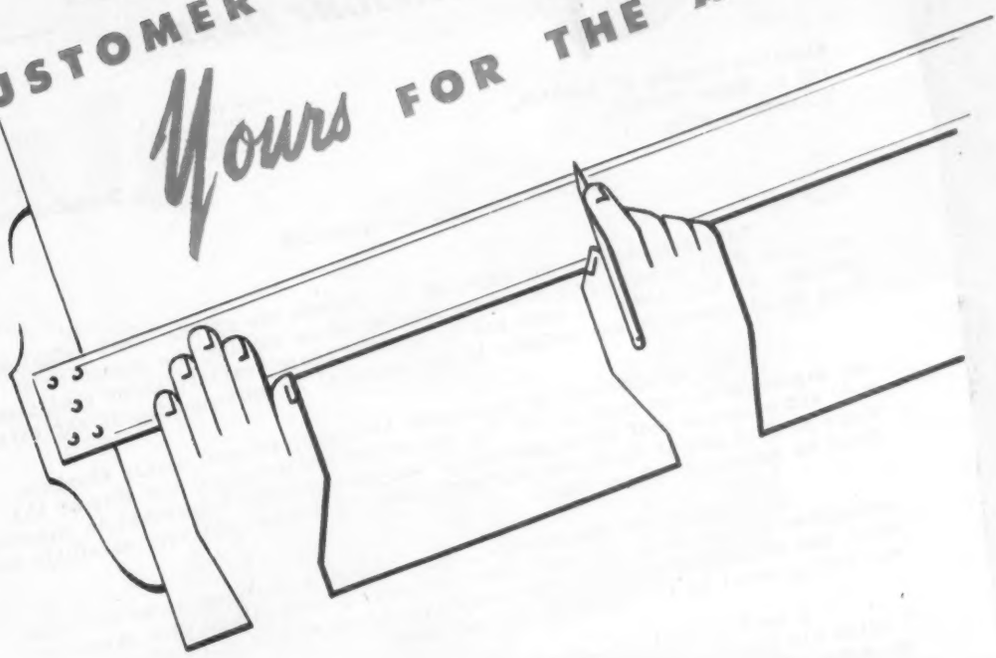
★ R. P. ADAMS COMPANY, INC. ★

75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS

CUSTOMER ENGINEERING SERVICE

Yours FOR THE ASKING



Here is a service expressly for your use—a service you can call on, without obligation, for help with your tubing specifications and requirements.

Feel free to consult our Customer Engineering Service when your problems concern copper or brass seamless tubing.

What to send us: Your blueprint, specifications, complete information regarding your contemplated use of tube.

WOLVERINE

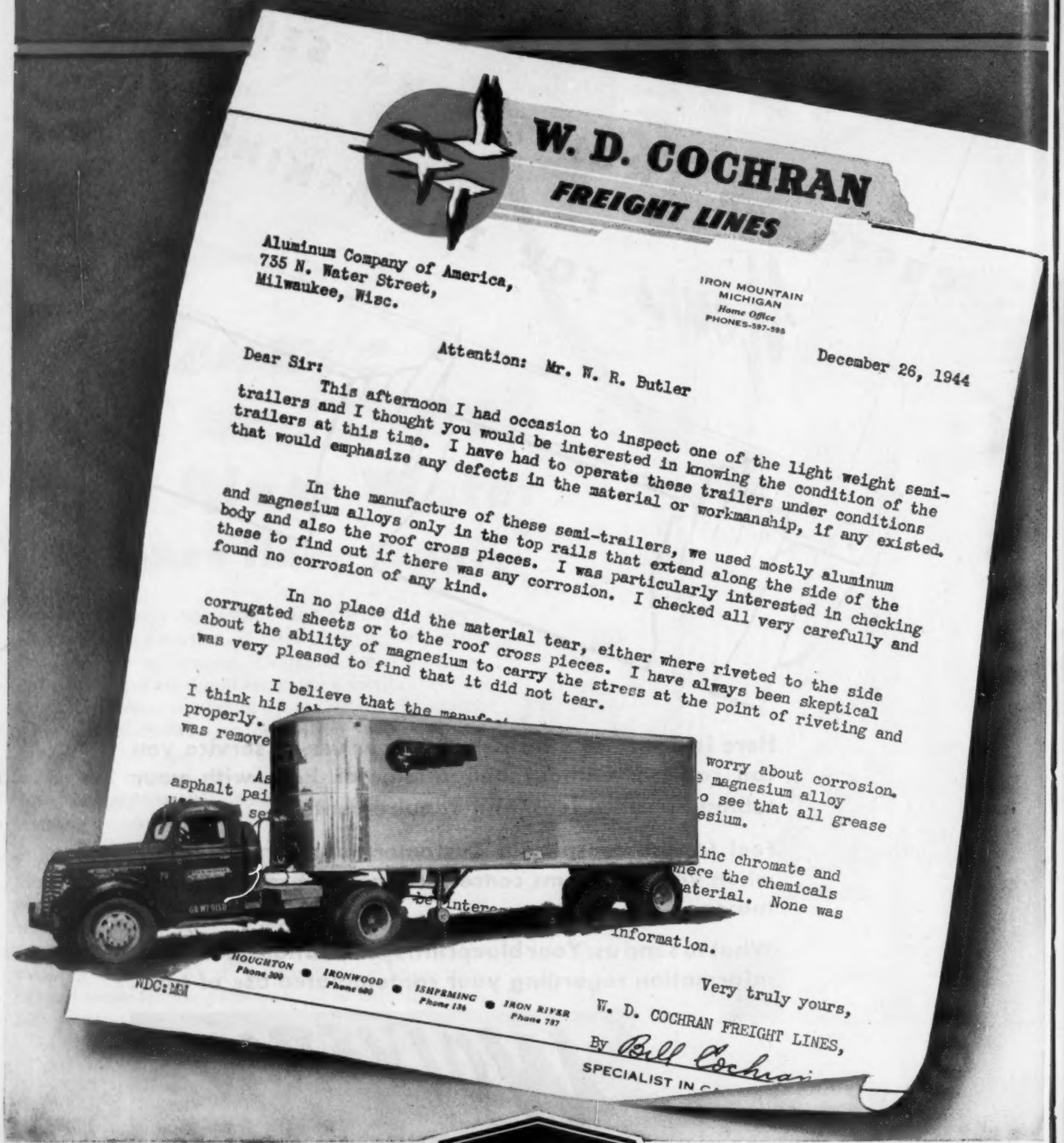
TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

1411 CENTRAL AVENUE • DETROIT 9, MICHIGAN

BUY WAR BONDS

A Fleet operator reports on Magnesium



W. D. COCHRAN
FREIGHT LINES

IRON MOUNTAIN
MICHIGAN
Home Office
PHONES-597-598

Aluminum Company of America,
735 N. Water Street,
Milwaukee, Wisc.

December 26, 1944

Attention: Mr. W. R. Butler

Dear Sir:

This afternoon I had occasion to inspect one of the light weight semi-trailers and I thought you would be interested in knowing the condition of the trailers at this time. I have had to operate these trailers under conditions that would emphasize any defects in the material or workmanship, if any existed.

In the manufacture of these semi-trailers, we used mostly aluminum and magnesium alloys only in the top rails that extend along the side of the body and also the roof cross pieces. I was particularly interested in checking these to find out if there was any corrosion. I checked all very carefully and found no corrosion of any kind.

In no place did the material tear, either where riveted to the side corrugated sheets or to the roof cross pieces. I have always been skeptical about the ability of magnesium to carry the stress at the point of riveting and was very pleased to find that it did not tear.

I believe that the manuf
I think his j
properly.
was remove

worry about corrosion.
e magnesium alloy
o see that all grease
esium.

As
asphalt pai
se

inc chromate and
here the chemicals
aterial. None was

be interes
information.

Very truly yours,
W. D. COCHRAN FREIGHT LINES,
By Bill Cochran

SPECIALIST IN C

WDC:MH

HOUGHTON Phone 300 ● IRONWOOD Phone 600 ● ISHPEMING Phone 156 ● IRON RIVER Phone 787

MAGNESIUM MAZLO PRODUCTS
REG. U.S. PAT. OFF.

AMERICAN MAGNESIUM
CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

NUTS to the axis

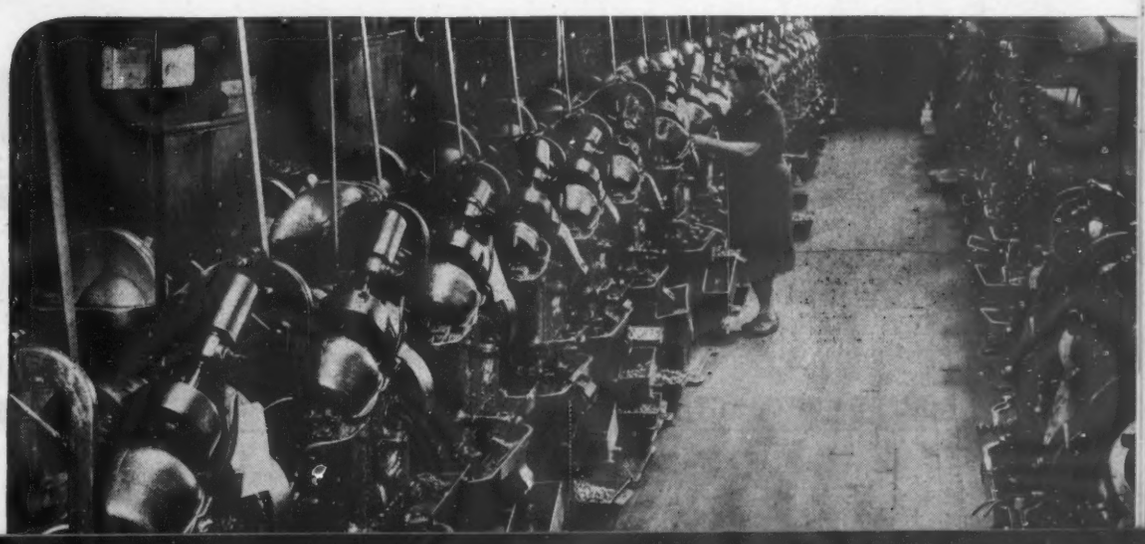
TODAY the dependability of circle Ⓑ fasteners is being proven in nearly every allied weapon used in this global war. Give a thought to this when you are planning your blueprints for tomorrow.

BUFFALO BOLT COMPANY

NORTH TONAWANDA, NEW YORK

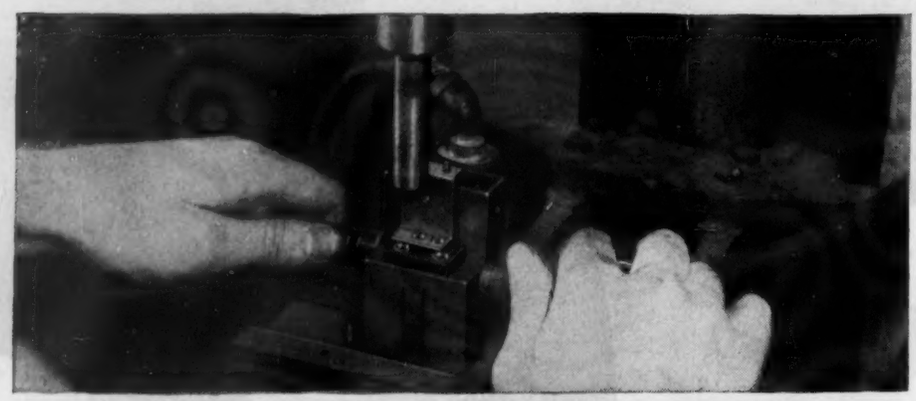
SALES OFFICES IN PRINCIPAL CITIES

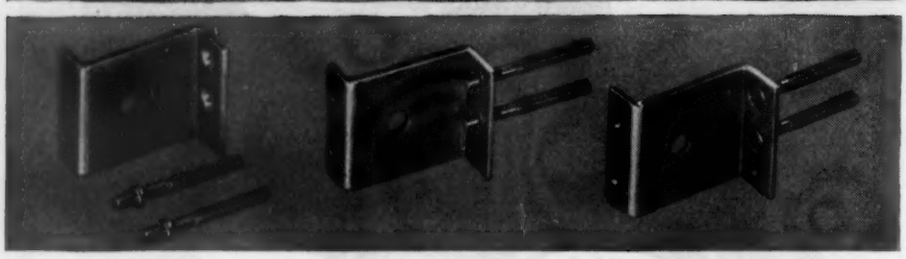
Ⓑ



● A section of one battery of nut makers which produces thousands of circle Ⓑ nuts daily—in various shapes and sizes.

Electrical Upsetting *with* Mallory Electrodes





produces Three Hundred Assemblies an hour instead of sixty

FASTENING two bolts to a bracket, with no protruding bolt heads, is now done by electrical upsetting in two simple operations—using Mallory Resistance Welding Electrodes—at rates up to 300 assemblies an hour, as against 60 an hour by conventional methods.

Two threaded bolts are inserted in a lower die made of a Mallory alloy faced with Elkonite*. A bracket, punched with square, countersunk holes, is placed over the bolts and held in position by two locating pins. Upsetting is performed by the upper electrode, also made of a Mallory alloy with an Elkonite face. Heated metal flows into the bracket holes and joins the bolts securely, flush with the bracket's surface. Then the completed assembly is ejected with an air operated stripper.

Long production runs, with minimum down time for electrode dressing, are achieved with this set-up, because the Elkonite welding surfaces combine high mechanical hardness with suitable electrical and thermal conductivity.

Experienced Mallory engineers can help you to determine the techniques of resistance welding best suited to your production. They can aid you in selecting electrodes of the correct alloy—whether you need spot welding tips or holders, seam welding wheels, or dies for flash, butt or projection welding. Consult Mallory today. Write for a free copy of the illustrated catalog on Mallory electrodes.

ATTENTION— WELDING ENGINEERS!

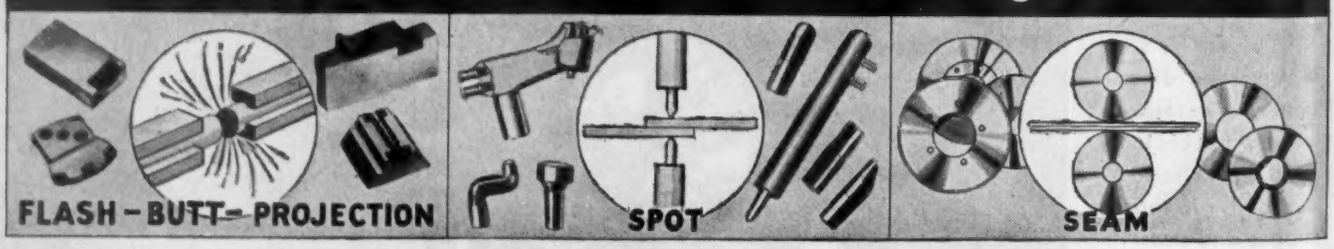
Now available—Third Edition Mallory Resistance Welding Data Book, a comprehensive text on resistance welding practices. Sent gratis to resistance welding engineers, when requested on company letterhead. Available to students, libraries and schools at $2.50 per copy, postage paid.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS 6, INDIANA

*Reg. U. S. Pat. Off. for refractory metal compositions.

P. R. MALLORY & CO. Inc

MALLORY Standard Resistance Welding Electrodes



★ ★ ★ WHEN THESE BEAUTIES ARE AT YOUR DISPOSAL !

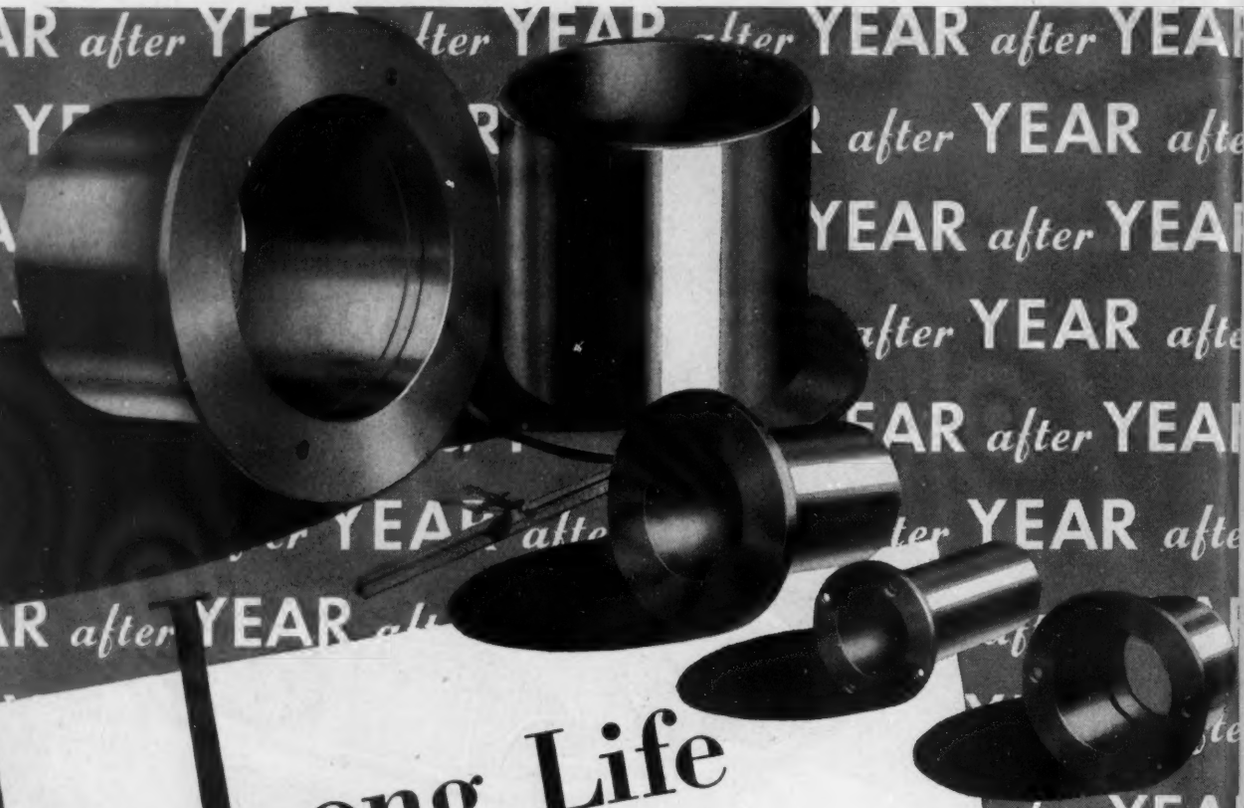
BUY WAR BONDS

Light alloys will play a more important part than ever before in the car of the future. Bohn is one of America's foremost sources for both aluminum and magnesium products so vital in the modern motor car.

BOHN ALUMINUM & BRASS CORPORATION, DETROIT 28, MICH.
★ ★ GENERAL OFFICES: LAFAYETTE BUILDING ★ ★

BOHN

Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS



Long Life

The life of a Sleeve Bearing is figured in years . . . not months. It is not unusual for us to learn of instances where Johnson Sleeve Bearings have been in continuous operation for fifteen . . . twenty . . . twenty-five years. And still delivering efficient performance.

There are several reasons why these records are possible. For instance, every Johnson bearing is made from the highest quality metal available. Every manufacturing operation is laboratory controlled. Johnson bearings are "tailor-made" to suit the application . . . to meet the operating conditions. Sleeve bearings are simple in construction . . . no moving parts within the bearing to fail.

Helping manufacturers to build real service into their product is a welcome assignment for Johnson Bronze. Simply call in a Johnson Engineer. Permit him to study your applications. Provide him with adequate information . . . speeds . . . loads . . . shock . . . or other operating conditions. He will give you the right solutions . . . based on facts . . . free from prejudice. Manufacturers giving thought to their postwar product will do well to consult with Johnson Bronze *now*.

JOHNSON BRONZE CO.
550 S. MILL ST. NEW CASTLE, PA.

Branches in 18 Industrial Centers

JOHNSON
SLEEVE BEARING HEADQUARTERS
BRONZE

"GULF LASUPAR CUTTING OIL

helped us increase production 15%

_____tool life over 100%"

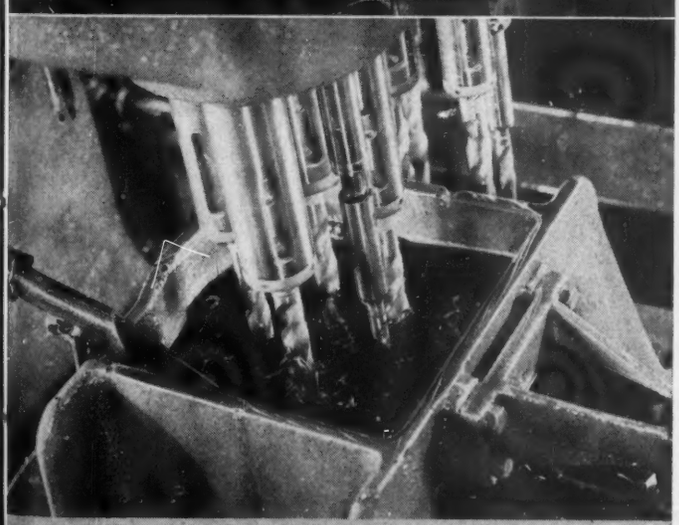
says this aircraft motor plant Foreman

WE GET BETTER RESULTS with Gulf Lasupar Cutting Oil than with any other cutting fluid we have tried for drilling master connecting rods," says this Foreman. "Lasupar helped us step up production 15% and tool life over 100%."

Here is a cutting oil that may be the answer to your tough, hard-to-speed-up machining operations—and to your requirements for an exceptionally fine finish on the work. Gulf Lasupar Cutting Oil has set new standards of performance for tough jobs in hundreds of aircraft, armament, and munitions plants.

And war production reports on Gulf Lasupar have a peacetime value: This performance-proven cutting oil can give important help to shops seeking lower unit production costs for postwar business!

Gulf Lasupar Cutting Oil—and the other quality cutting oils in Gulf's complete line—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.



(Above) Actual photo of a Gulf Service Engineer (right) consulting with Foreman on results with Gulf Lasupar Cutting Oil in drilling master connecting rods for aircraft engines. *(Below)* Close-up of drilling operation.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION
GULF REFINING COMPANY
GULF BUILDING, PITTSBURGH 30, PA.

MEMO...from the desk of Exec. Vice President.

Att. Advertising Dept.

INVOLUTE
SPLINE GAGES
BY VINCO

"Setting by Tiffany" — "Gage Blocks by Johansson" — names that because of consistent perfection inspire confidence in the product — the ultimate goal of every conscientious manufacturer — Vinco has qualified for this select group — for instance, "Involute Spline Gages by Vinco" — even competitive consensus agrees that we lead the field in this branch of gaging — we pioneered involute spline gages — we developed grinding, lapping and control methods — exclusively Vinco — that produce involute spline plugs and rings so consistently perfect that "Involute Spline Gages by Vinco" is an accepted standard wherever gages are used.

L. L. Butler

MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U.S. PAT. OFF.

VINCO CORPORATION, 8863 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

THOUSANDS IN USE TODAY

Wells No. 8

Maybe it's a good idea for you, too—

THE many users indicate—that this Wells No. 8 is the practical, efficient tool that solves metal-cutting problems. A Wells will cut most any shape, size or type metal you can get into the machine. Efficient, it cuts close, removes a minimum of stock. It's easy to use, too. Because it's portable, you can save time and labor by moving the saw to the work. Use this Wells No. 8 to free large production units for other work. It's ruggedly built, simply designed—keeps right on cutting year in and year out. Satisfied users in every branch of the metals industry are your assurance . . . that you can't go wrong by finding that you, too . . . have a spot in your plant for a Wells No. 8.

SPECIFICATIONS:
WELLS No. 8

CAPACITY: . . Rectangular 8" x 16"
(Special Guides) . . . 5" x 24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . ½ H. P., A. C. or D. C.
SPEEDS:
Selective 60, 90, 130 feet per minute
WEIGHT: . Approximately 750 pounds

Wells SAWS
the sign of Superior

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

This "ONE-MAN" G-H BALER May be the Answer to Your Salvage Problem!

Model MC Floor Type
Two-Ram Hydraulic Baler for Sheet Metal Stampings and Clippings and Non-ferrous Scrap. Requires no pit, may be located at most convenient place; moved if necessary.

It Bales Sheet-Metal Scrap Profitably in Moderate Volume

No longer need sheet metal stampings and clippings or non-ferrous scrap accumulate in unsightly, space-consuming piles to wait for the junk man. No longer need it be handled, re-handled and stored . . . at needless cost.

In stamping and metal working plants of various sizes, Model MC Floor Type Hydraulic Balers are disposing of such scrap as it accumulates . . . in an orderly, efficient way. In many cases, a "one-man" salvage and baling department handles the whole operation, with time left over for other duties.

Like all G-H Balers, the Model MC is built for many years of rugged, heavy-duty service; converts sheet metal scrap into dense, compact bales at low cost. It is built in capacities from about ½ ton per hour and up.

For Experienced Counsel on Your Baling Problem, write

GALLAND-HENNING MFG. CO., 2747 S. 31st St., Milwaukee, Wis.

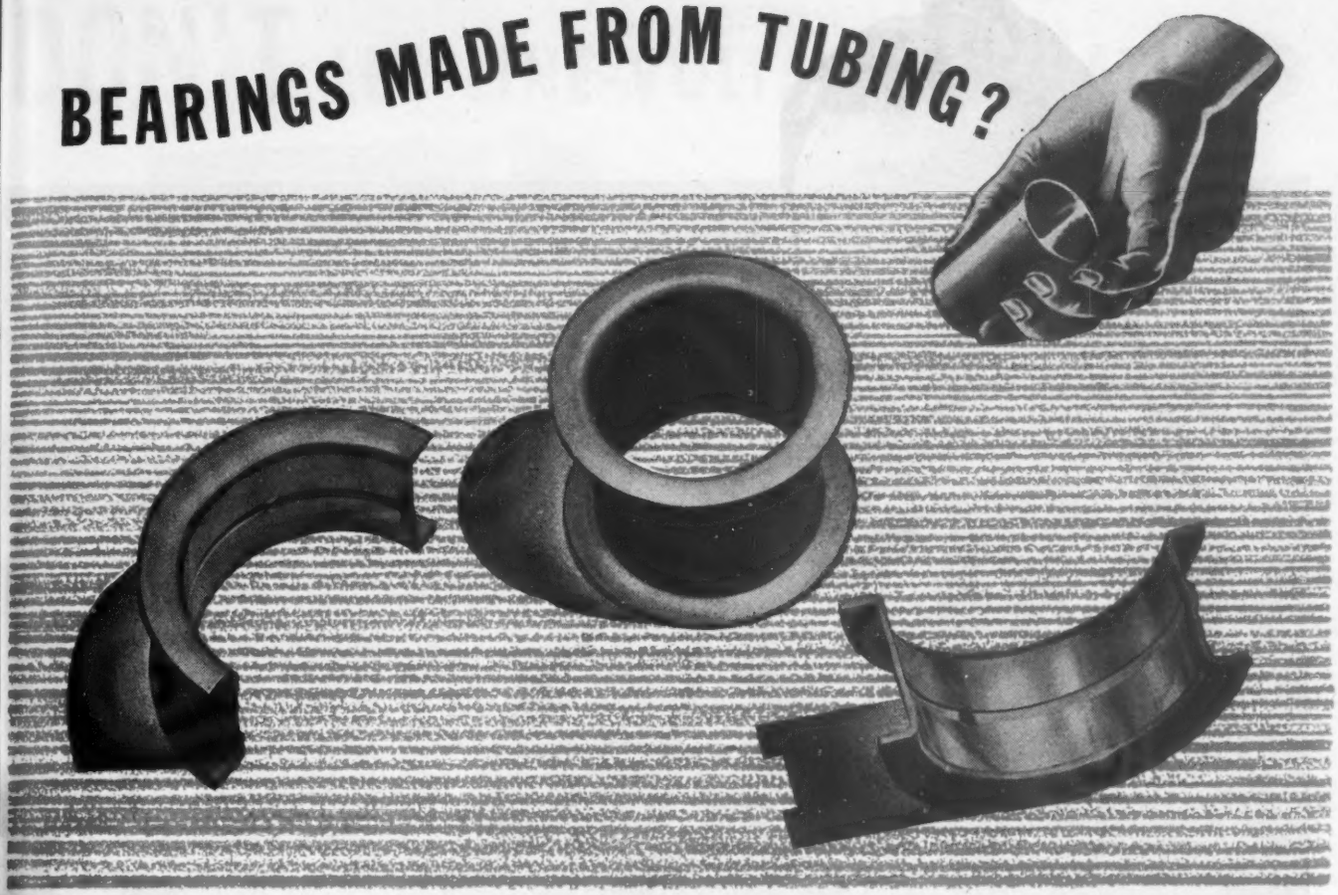
G-H Scrap Metal Balers are built for the efficient, low-cost baling of all types of sheet metal scrap . . . in capacities up to 20 tons per hour and more.

GALLAND-HENNING

SCRAP METAL BALING PRESSES

A 4586-1P

BEARINGS MADE FROM TUBING?



Here they are—

Yes, these automotive bearings were made from standard 2″ O. D. x 14 gauge Republic ELECTRUNITE Tubing—cut, flanged, machined and drilled as shown above.

Here is *proof* of the workability of ELECTRUNITE Tubing . . . *proof* that it offers you the easy-to-work characteristics which mean higher rate of output and lower unit production cost . . . *proof* that you should consider the possibilities of using this versatile, modern tubing in your own manufacturing operations.

ELECTRUNITE Tubing is highly uniform in diameter, wall thickness, concentricity, strength, weight, tolerance, ductility and scale-free surface—because it is made by the electric resistance weld process—*the only process* which insures these qualities consistently, in every length.

ELECTRUNITE engineers will be glad to help you in determining where ELECTRUNITE Tubing can be *profitably* used in fabricating your present and anticipated postwar products. Just write us.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

Republic
ELECTRUNITE TUBING
Reg. U. S. Pat. Off.

Mechanical, Aircraft, Stainless Steel and Rail Steel Tubing—Boiler, Condenser and Heat Exchanger Tubes

Everyone appreciates a good tip. Metal men the country over have found it to be sound advice when their friends suggest calling Houghton for help in heat treating.

Here is a firm with over seventy years of experience in metal working . . . maintaining a field force of trained men in every section to help produce more for Victory . . . and supplying a large percentage of the salts, carburizers, quenching and cutting oils used in America's great industrial plants.

We've learned it the hard way, and are glad to pass on to metal men our accumulated knowledge of practical heat treating that has solved so many puzzling problems. What's yours?

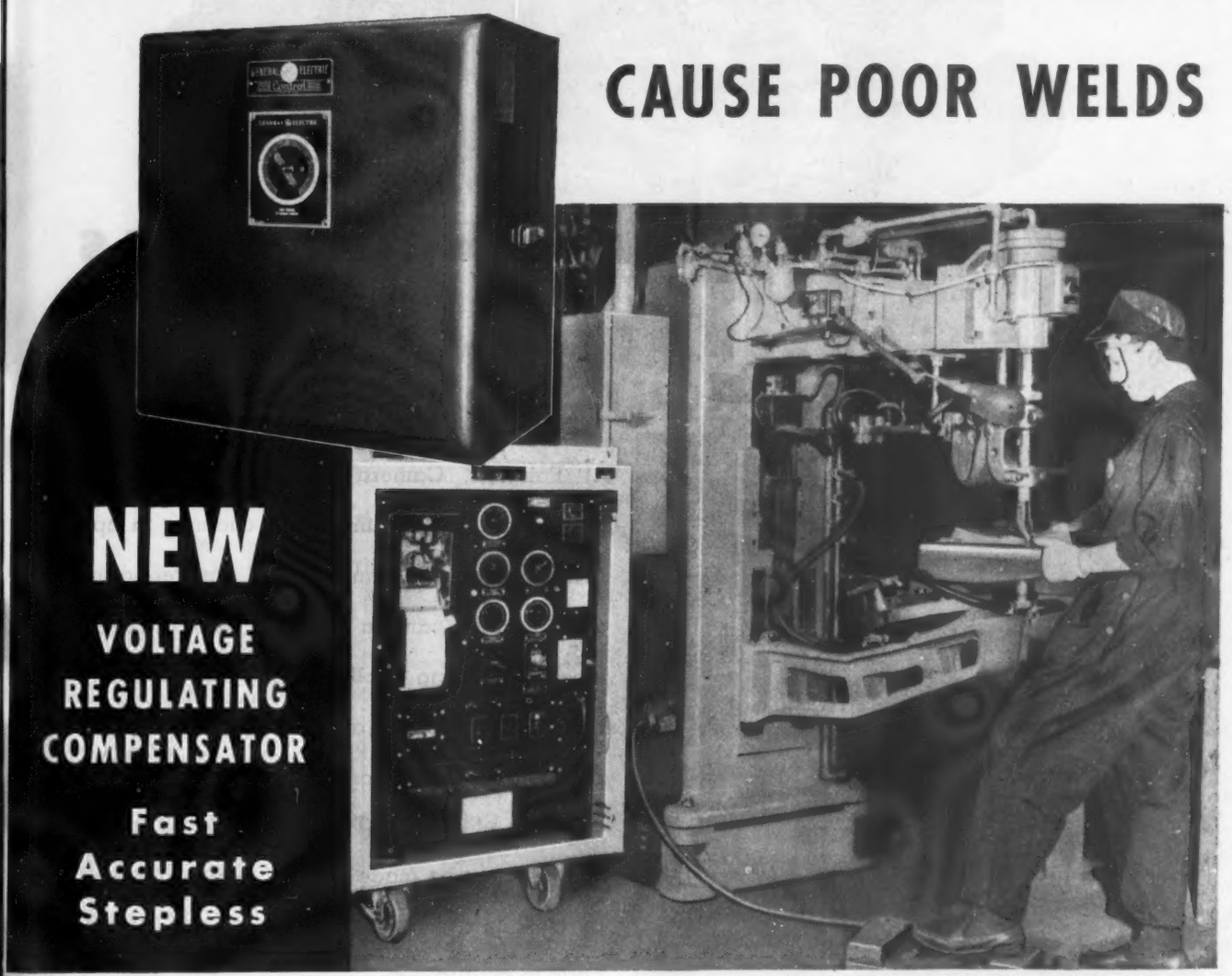
E. F. HOUGHTON & CO.

PHILADELPHIA

CHICAGO SAN FRANCISCO DETROIT

HOUGHTON'S *Liquid* SALT BATHS

DON'T LET LINE-VOLTAGE VARIATIONS CAUSE POOR WELDS



NEW VOLTAGE REGULATING COMPENSATOR

Fast
Accurate
Stepless

The voltage-regulating compensator is built into the bottom of this G-E control. In the welding of airplane parts, this compensator keeps the welding current uniform when other machines "hit" the line and cause a voltage drop.

Helps insure good welds by holding the current constant

THIS electronic compensator, for use with G-E resistance-welding controls, automatically regulates weld current, holds it constant, regardless of line-voltage variations.

1. **ACCURACY OF OPERATION**—The weld current is held within plus or minus 2 per cent of the preselected value, for variations in line voltages of plus and minus 20 per cent.*

2. **SPEED OF COMPENSATION**—If there's a sudden change in line voltage, this compensator will correct for 75 per cent of the change in 1 cycle, provide 100 per-cent correction within 3 cycles.

3. **RANGE OF CONTROL**—Functions over the entire heat-control range of the main control circuit. This range is normally from 20 to 100 per cent for 460- to 575-volt applications, and 40 to 100 per cent for 230-volt applications.

**This allowable voltage deviation may be limited by your other electronic controls.*

Buy all the BONDS you can—and keep all you buy

GENERAL ELECTRIC

RESISTANCE-WELDING CONTROL

Want more information?

General Electric Company, Sec. H645-31
Schenectady 5, N. Y.

Please send me a copy of your bulletin (GEA-4223) which will tell me more about compensating line-voltage variations.

Name.....

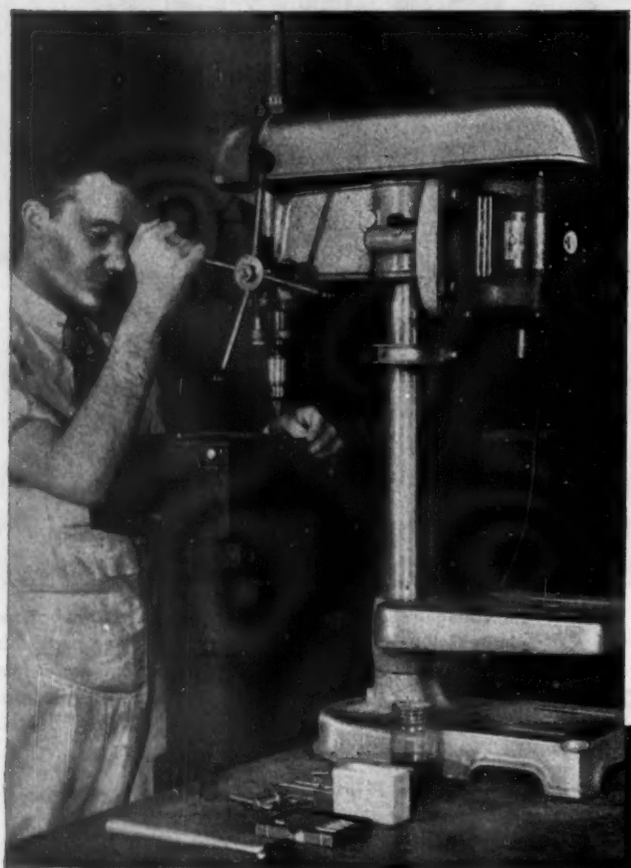
Company .....

Address .....

.....

8960

WALKER-TURNER MACHINE TOOLS PROVIDE A BALANCED PRODUCTION LINE FOR FAIRCHILD CAMERAS

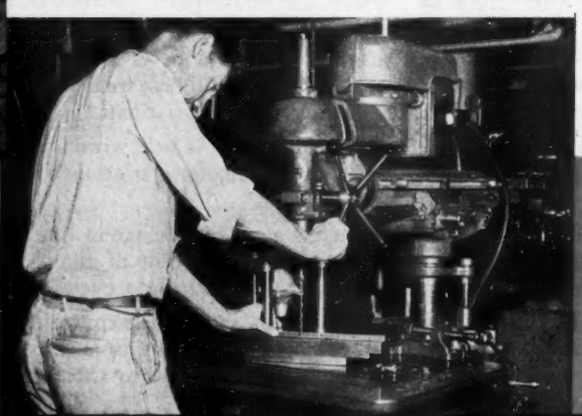


15" DRILL PRESS drilling and reaming holes for locating pins on Fairchild aerial camera lens cone. One of many Walker-Turner Drill Presses in this plant.

WALKER-TURNER RADIAL DRILL drilling Fairchild Sound Recorder drive assembly. Easily maneuvered for drilling large castings. Tilting head eliminates need for angle vice and special set-up in drilling angled holes.

At Fairchild Camera and Instrument Corporation, production lines require quick changes in operations. Drilling, tapping, reaming, and counter-boring of all sizes of aerial camera parts are some of the important jobs assigned to Walker-Turner Drill Presses. These rugged, simple tools are readily moved from one department to another, or within departments, as needed. Because of Walker-Turner flexibility, all operation changes can be made quickly — regardless of size of part. Thus a steady flow of urgently needed camera parts is maintained.

WALKER-TURNER CO., INC., PLAINFIELD, N. J.



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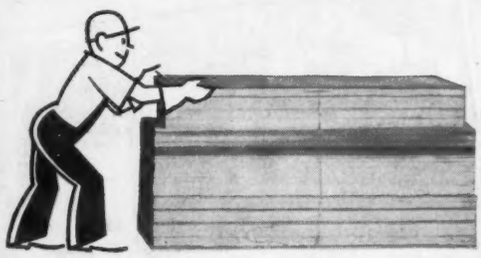

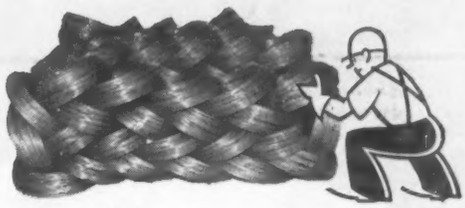

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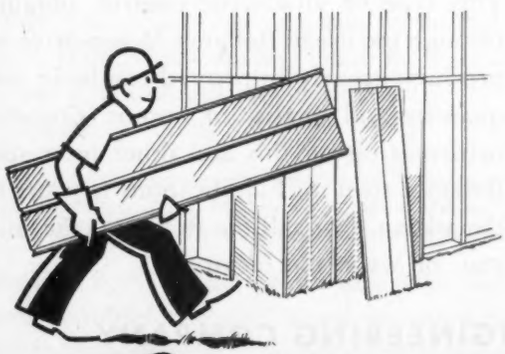

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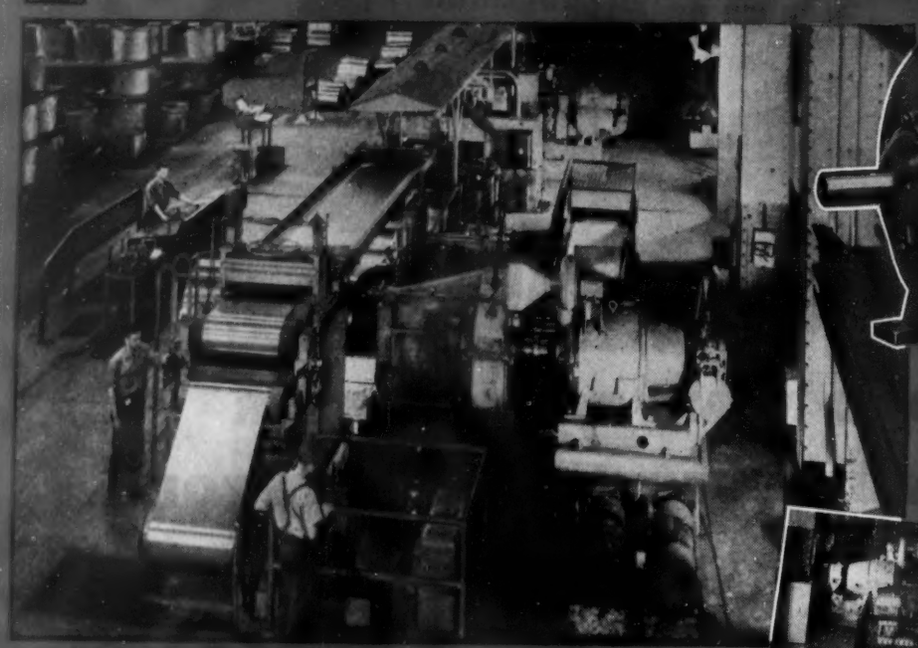
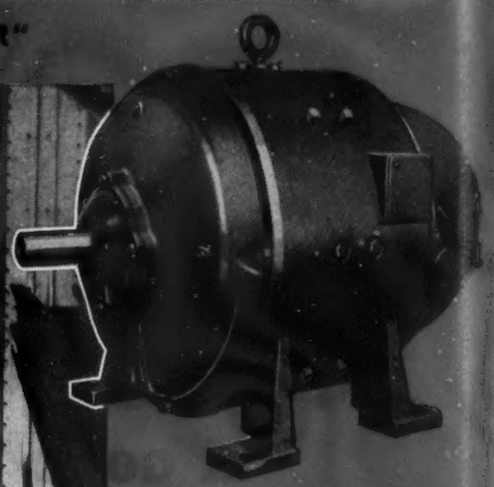
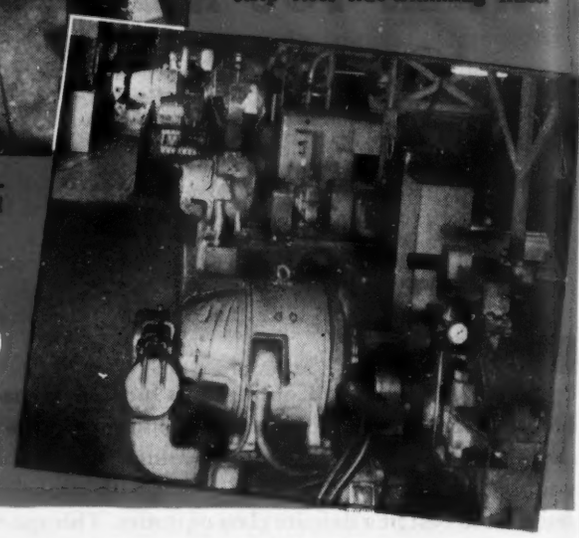




The motor on the job: Reliance Type T Heavy Duty—for use on strip steel side-trimming lines.



Above: The exit, or recoiler, end of line, where Reliance Motor-drive helps attain maximum production. *Right:* Motors at work!

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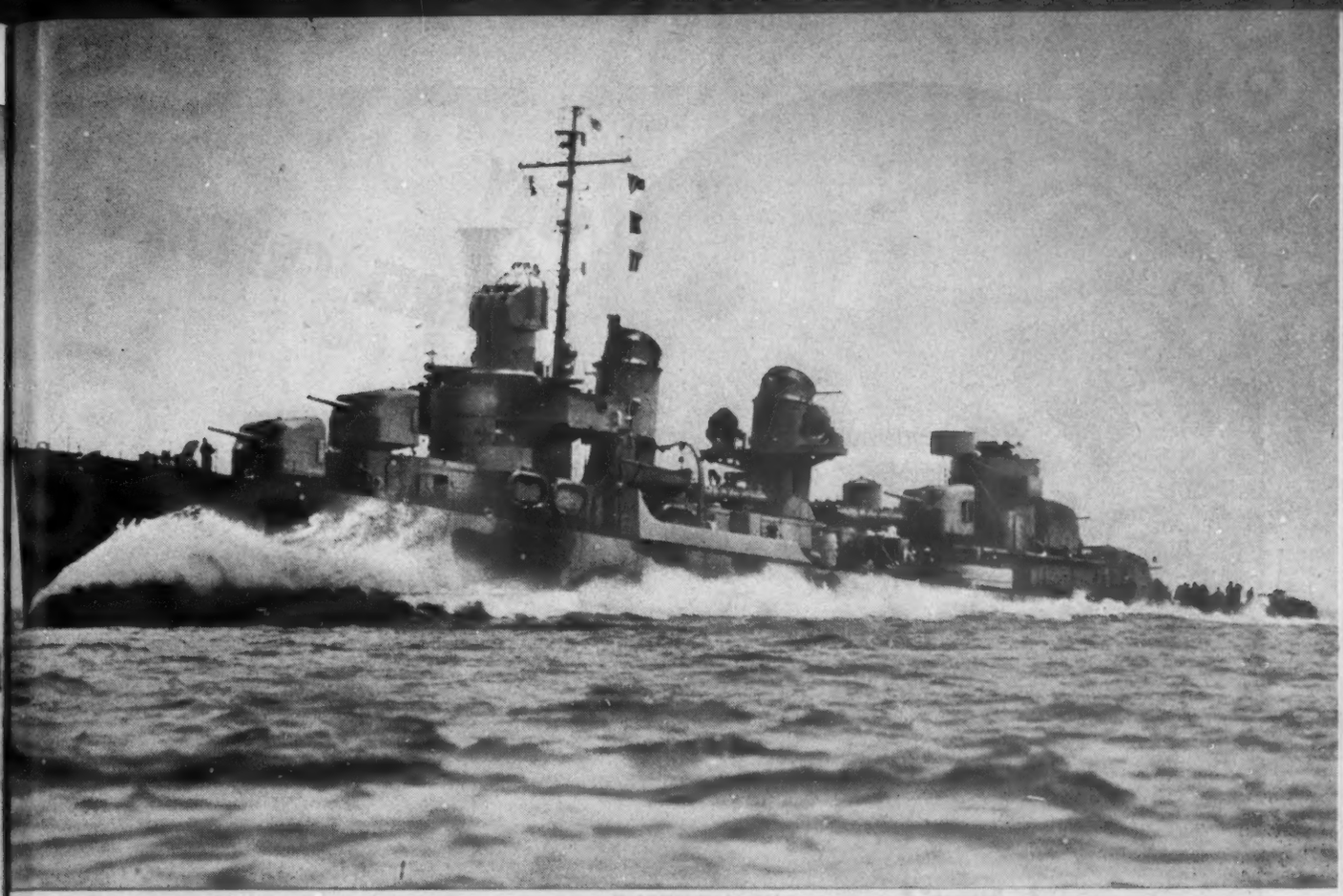

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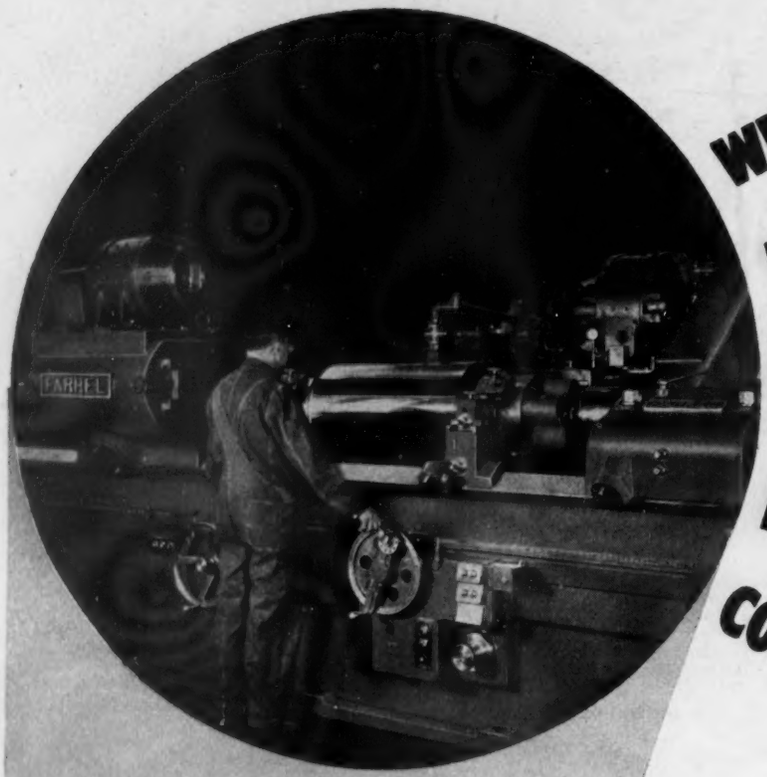

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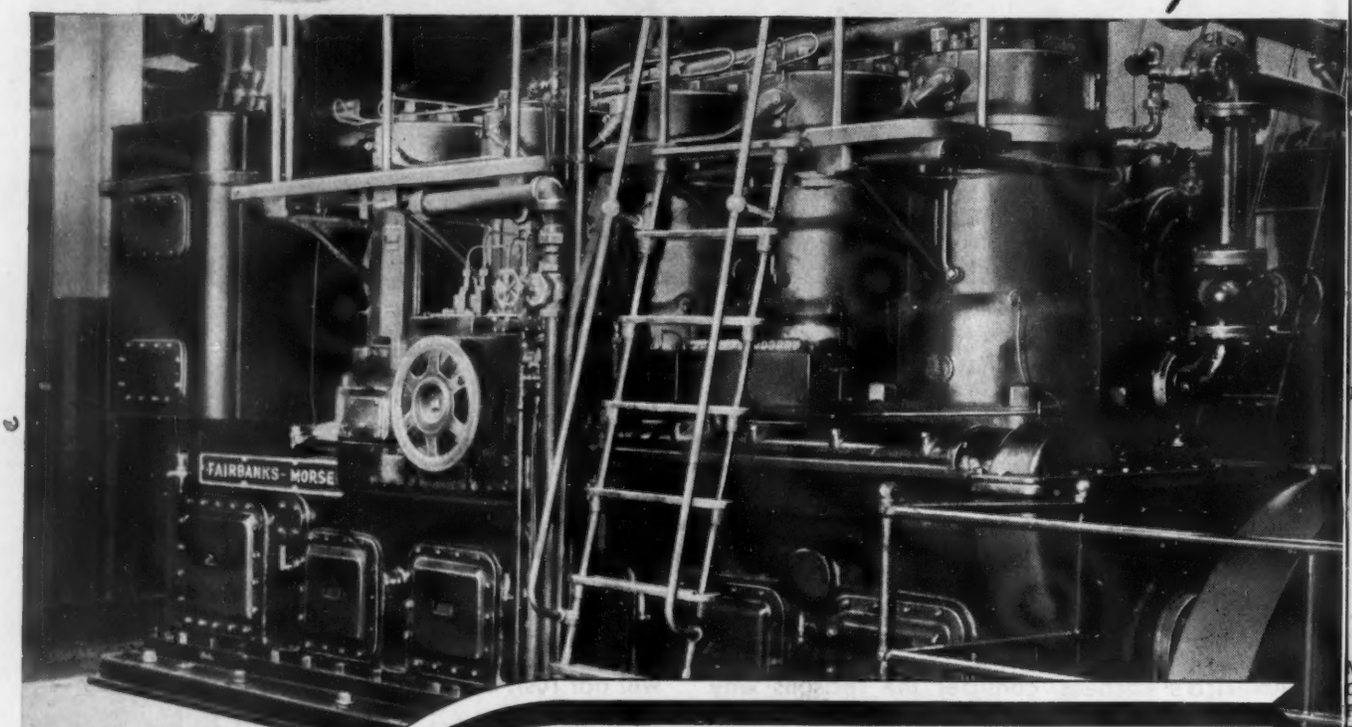

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Published by THE PENTON PUBLISHING CO., Penton Bldg., Cleveland 13, Ohio, E. L. SHANER, President and Treasurer; G. O. HAYS, Vice President and General Manager; R. C. JAENKE, Vice President; F. G. STEINEBACH, Vice President and Secretary; E. L. WERNER, Assistant Treasurer.

Member, Audit Bureau of Circulations; Associated Business Papers, Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116, NO. 14 April 2, 1945

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Machine Lubrication Pays Dividends

English Representative: International Construction Co., 56 Kingsway, London, W. C. 2, England

STEEL
April 2, 1945

Capitalizing Experience

A manufacturer of machine parts was reviewing wartime experiences and outlining tentative plans for postwar activity. His story—perhaps typical of scores of others—is substantially as follows:

"Before the war we employed 1200 persons. We manufactured a standard part widely used in many machines. We specialized on this product with such success that our company never failed to declare a dividend, even during the depression.

"It happens that our product is as useful in machines of war as it was in machines of peace. Consequently we were granted a high priority on it. Production since Pearl Harbor has been greater than it was before the war. However, we were called upon to assume additional war work. For several years we have been operating a government-owned plant employing 10,000 persons. This operation, coupled with the expanded activity on our peacetime specialty, makes us a wartime employer of about 12,000 workers.

"When the war ends, employment in this government-owned plant will cease. Its facilities are of a character that cannot be converted to peacetime production. It is destined to fade out of the picture and with it jobs for 10,000 persons will go glimmering.

"However, whereas our employment jumped from 1200 to 12,000 because of the war, we figure we can employ at least 2500 in the postwar period. Of this number, the original 1200 plus one or two hundred additional workers will be employed on new parts which we have found we can manufacture successfully as a result of wartime experience.

"For instance, at one stage of the war effort we assumed a sub-contract for a certain item of munitions. The prime contractor liked the way we handled the sub-contract. He has agreed that when he resumes output of his peacetime product he will contract with us to furnish certain parts which, by virtue of our wartime affiliation, he is confident we can manufacture satisfactorily.

"A number of similar alignments—all resulting from wartime experience—make us feel certain that on a conservative estimate we can employ 2500 persons profitably in the postwar period."

This testimony, from a company that is planning to double its prewar employment, is significant. It makes us wonder whether or not other wartime sub-contractors are prepared to capitalize in the postwar period upon the reputation for service they won under the pressure of war.

A SOUNDER CHARTER: No one can read the charter for industrial peace announced last Wednesday by Eric Johnston, Philip Murray and William Green without realizing that it has great potentialities. If adopted, it would put the sponsors on record as favoring:

1. Improved productive efficiency and technological advancement.

2. Preserving the rights of private property and free choice of action under a system of private competitive capitalism.

3. Recognizing and preserving the right and responsibility of management, to direct the operations of an enterprise.

4. Recognizing and preserving the rights of labor to organize and to bargain collectively.

5. Protecting the individual against the hazards of unemployment, old age and physical impairments beyond his control.

6. Fostering sound international trade.

7. Seeking enduring peace through an international security organization.

It is true that these are broad generalities, but it is equally true that if management and labor could

(OVER)

agree wholeheartedly in the spirit of these principles they would narrow considerably the sector in which conflict might arise after the war. Most significant is the fact that this charter is infinitely sounder in many respects than the alleged magna charta of the Wagner act and than the government's hopelessly confused labor policy.

Industry has much to gain and nothing to lose in supporting this movement. —p. 76

° ° °

"TRADING PIT" WORKS: Representatives of the military services and government production agencies have resorted to the technique of the securities and commodity exchanges in order to facilitate the distribution of available machine tools and other production equipment. They have established a "machine tool trading pit," which is a central supply point or pool into which machine tools and other production equipment having a unit price of over $3000 are reported as they become available for transfer from one type of war production to another.

The trading pit has been operating for several months. Through March 8 it cleared a total of 4463 items authorized to be sold, transferred or leased to war contractors. Whereas at one time weeks or even months elapsed before an idle machine could be transferred to active war duty, under the trading pit procedure the time lag has been reduced to days and in some instances hours.

The idea may have merit in the disposal of surplus equipment. —p. 80

° ° °

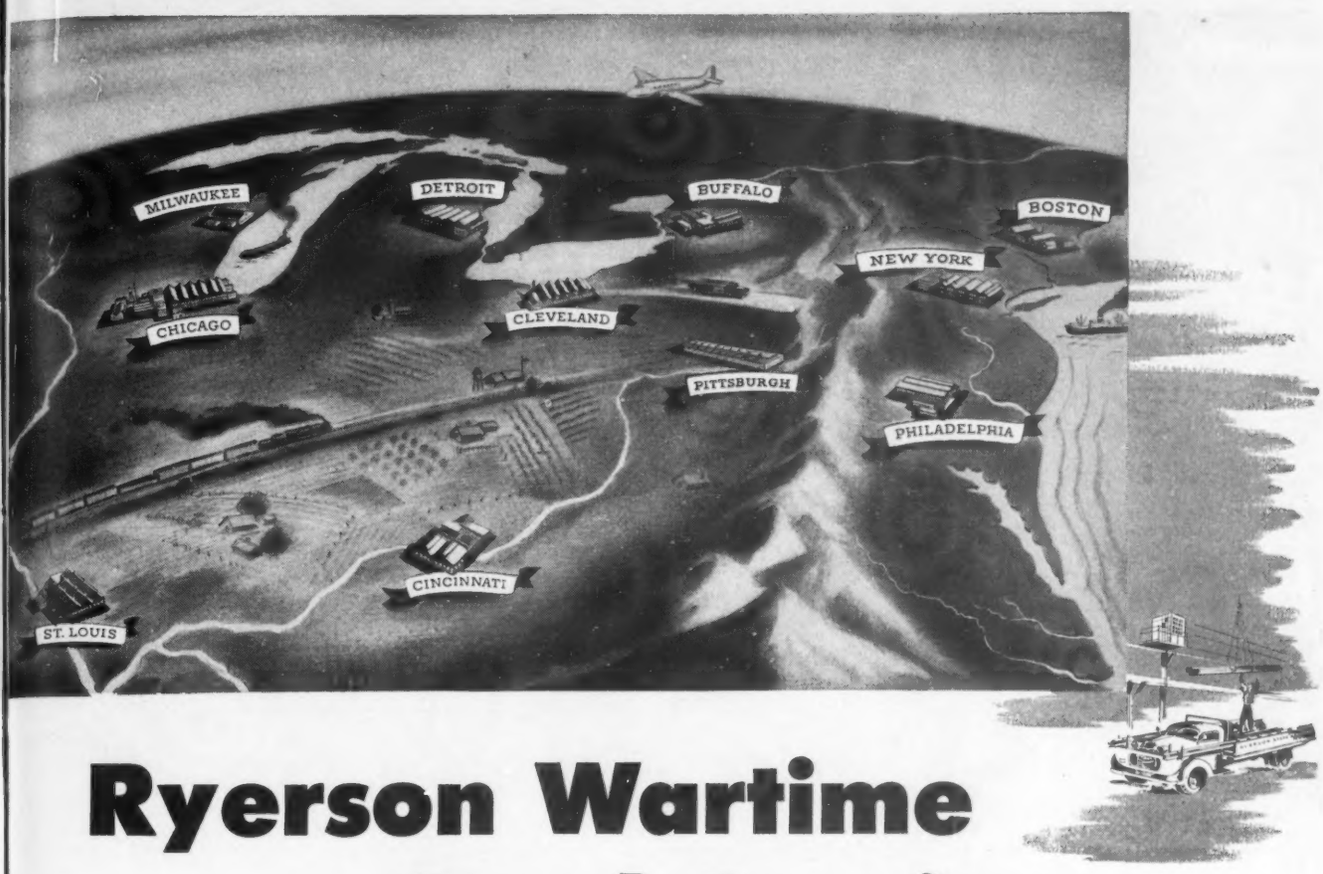
RECONVERSION WAGES: Last week the third regional War Labor Board ruled that a company now partially reconverting to the manufacture of bathtubs must continue to pay wartime wage rates on peacetime products. The board held that "once reconversion takes place on a large scale, any substantial reduction in rates would result in wide deflation with harmful consequences to the national interest."

This case presents a foretaste of the intricate wage and price problems that will arise as production swings away from war goods and toward peacetime products. Right now powerful government forces are arrayed against inflationary tendencies, although more inflation has been permitted in wages than in any other element of costs. This failure to act uniformly against all inflationary forces may prove to be an embarrassing factor when the government starts to wage war against deflationary tendencies, as it certainly will when full-scale reconversion gets under way. —pp. 73, 76

SIDELIGHTS ON WAR: WPB officials are concerned over the supply of quality (hot topped) steels for shell forgings. Military procurement agencies estimate they need 2,480,000 tons monthly (p. 87), whereas monthly capacity for producing these steels is about 2,200,000 tons. New capacity is expected to reduce the deficit by 150,000 tons monthly to be made up in some other way . . . . Transcontinental railroads serving the West Coast expect that when the European war is over and when heavy emphasis is placed upon shipping supplies to the Pacific war front, traffic on these western rail lines will increase at least 25 per cent over the previous peak. The roads have made extensive preparations for this emergency (p. 93) by installing new equipment, enlarging yards, eliminating bottlenecks and inaugurating a very efficient centralized traffic control system . . . Department of Commerce reports Belgian machine tool dealers are anxious to renew contacts with American builders (p. 98) and to visit the United States to observe developments in the machine tool industry . . . . A large producer of open-hearth steel who has been using substantial tonnages of battlefield scrap (p. 105), says no deleterious effects from charging such material will result if the steelmaker will realize that proper segregation of the scrap is essential . . . . As of Feb. 28, 1945, there were 2715 terminated government contracts still unsettled (p. 86), largely because contractors had not submitted claims . . . Chrysler's president, K. T. Keller, is an ardent advocate of a strong ordnance department (p. 89)—even in peacetime. He urges that adequate research and "the pattern of co-operation between industry and ordnance" be kept alive after the war is won "as a bulwark of our national security." . . . Packard Motor Car Co. will include research in gas turbines and jet propulsion engines in its advanced aircraft engine development program (p. 96) undertaken at the request of the Army Air Forces ATSC. . . . Sales of surplus government property are running at a rate of about $1,000,000 per day (p. 75), the government recovering about 46 cents per dollar of original cost. . . . Cutting back the new navy program from the 84 combat vessels so recently announced to 12 caught steel producers by surprise (pp. 75, 181) and is resulting in cancellations, some of which will affect rolling schedules as early as April. Most of the eastern shipyards are affected by the cutback.

E. L. Shaner

EDITOR-IN-CHIEF



Ryerson Wartime Steel Service

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At present our service cannot always be as fast nor our stocks as complete as under normal conditions. Nevertheless, stocks are large and deliveries generally satisfactory. Where an item is not in stock at our nearest plant, it usually can be shipped from one of our other plants. Very often we are able to give unusual service and help to avoid factory or machine shut-downs.

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RYERSON CERTIFIED STEELS

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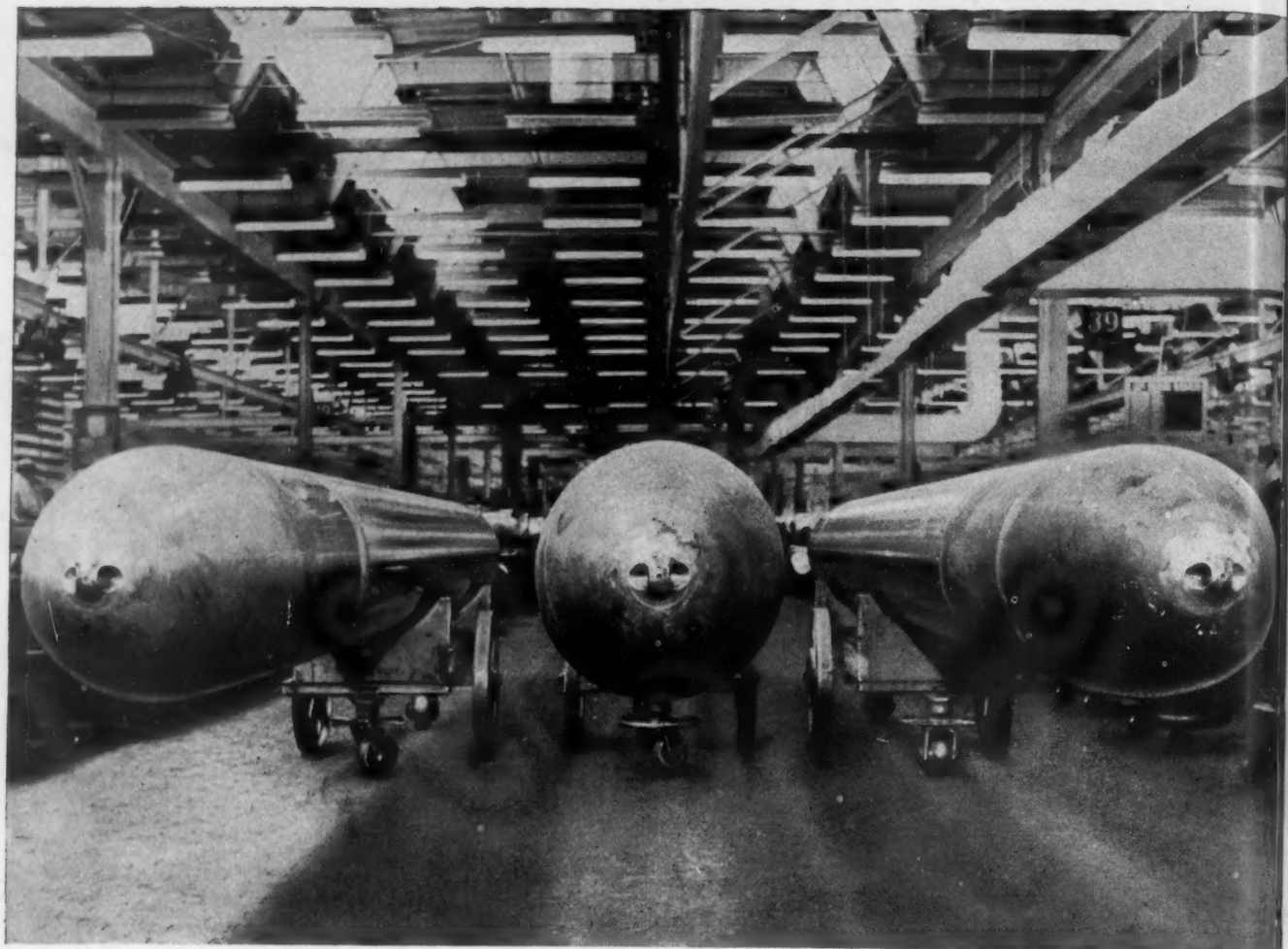

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RECONVERSION RUSTPROOFING

5 Points to Remember

1. Upon termination of war contracts, Government-owned production equipment must be rustproofed promptly, in accordance with *official instructions.*
2. Ordnance Specification P.S. 300-4 contains *official instructions* for the complete processing of such equipment.
3. These instructions require that only rustproofing materials meeting Government specifications be used.
4. *Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.*
5. For full information, see your Texaco representative or write to us.

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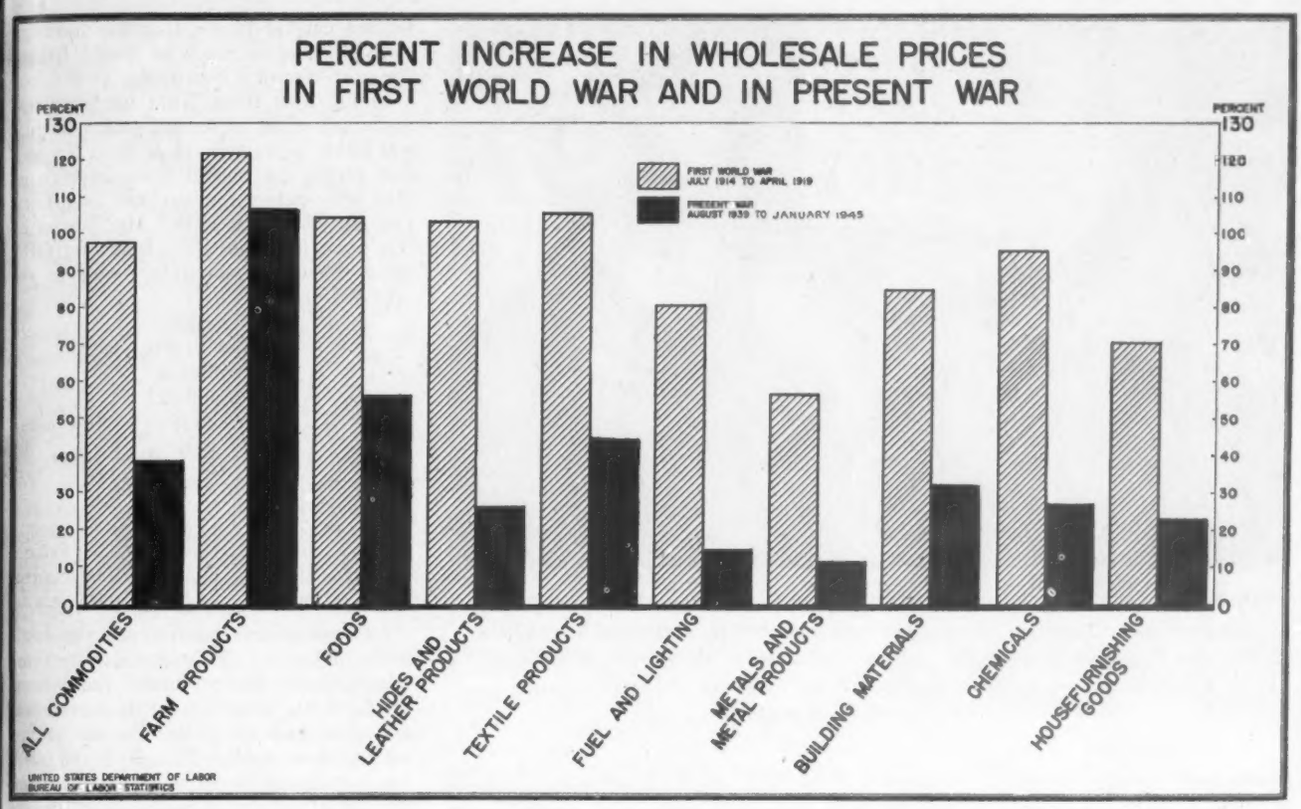
TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS



Stabilization Act Extension Seen

Increase in living costs in present war much lower than in first World War. Wholesale commodity price rise held to less than 40 per cent compared with more than 100 per cent in 1914-19. OPA chief warns dangers still lie ahead

PRICE control in World War II, although subject to much criticism and dissatisfaction, has been much more effective than in World War I and the price stabilization law is expected to be extended beyond its present expiration date of June 30.

This is indicated by the evidence and comments heard during the hearings on price control before the Senate Banking and Currency Committee in which Chester Bowles, Office of Price Administration chief, submitted comparative figures on price advances in the two wars. He drew many appreciative expressions from the committee members.

Lowest percentage of increase, as shown in the accompanying chart, has been in prices of metals and metal products, which advanced only 11.6 per cent from August, 1939, to January, 1945, compared with 56.6 per cent in similar period of last war.

Major questions still to be decided before the law is extended are the extent to which subsidy payments will be permitted to protect ceiling prices beyond June 30 and the extent to which the farm bloc will be allowed to introduce amendments intended to give special benefits to farmers.

The House Banking and Currency Committee will turn its attention to the law soon after it has completed hearings on the Bretton Woods proposals. Hearings and conferences on the revised bill probably will extend into June.

Mr. Bowles' reception before the Senate committee was fairly agreeable, but he ran into criticism on questions concerning food supplies, especially meats. His figures on the effectiveness of price control were convincing and his contention that the law was enforced successfully—on the whole—went unchallenged.

"In the 64 months covering the period from August, 1939, to December, 1944, the index of wholesale prices increased 38.7 per cent," he told the committee. "During the same period of the last war, wholesale prices increased 114.7 per cent and they continued until a peak was reached in May, 1920, when the index showed a rise of 148.4 per cent since the beginning of the war in July, 1914.

"Since May of 1943 when the hold-the-line order first became effective we have held wholesale prices without change. In fact, the index of wholesale prices has actually declined 0.1 per cent.

"Our overall record in holding the prices of those products which make up the cost of living is also, I believe, satisfactory. Since May of 1943, when the hold-the-line order first became effective, living costs for lower and middle income families, according to the index of the Bureau of Labor Statistics, have increased only 1.5 per cent. During the comparable period of the last war the cost of living rose 20 times as much, that is, by 30.5 per cent."

The very success attained to date, said Mr. Bowles, may be misleading with regard to such difficulties as may lie ahead. He submitted the following Bureau of Labor Statistics breakdown of cost-of-living figures from May, 1943, through December, 1944, where the present danger areas lie:

Item	Relative Importance Per Cent of Living Costs	Per Cent Change
Food	40	— 3.9
Rent	17	+ 0.3
Fuel, electricity, ice	6	+ 1.7
Miscellaneous	20	+ 6.8
Clothing	13	+11.6
Housefurnishings	3	+14.3

Main significance of this table, as Mr.

Upon Chester Bowles, left, OPA administrator, and William H. Davis, former chairman of the National War Labor Board and recently appointed head of the Office of Economic Stabilization, falls a large share of the burden of maintaining a stable price-wage relationship. Here they are shown conferring in Washington. NEA photo

Bowles told the story, is that if the present law is to be changed it must be strengthened, not weakened. He advocated an amendment for stronger control over rents which, he said, continue to get out of hand.

"From more than 100 OPA defense rental areas we have received reports of substantial increases in the rents of expiring commercial leases. Many landlords are writing unduly harsh provisions into new leases. Manufacturers engaged in war production have been threatened with evictions. Small storekeepers, local merchants, professional people and even chain merchandisers have complained of excessive rent increases," he declared.

Amendment Condemned

Mr. Bowles condemned the amendment in the existing law which required the price administrator to re-examine ceiling prices on all major cotton textile items. This amendment produced a complication of effects which completely nullified the intent of Congress; it failed to bring about parity prices on raw cotton and it failed to stimulate production of cotton goods in the low-price range. Mr. Bowles recommended a change whereby prices of cotton textiles would be set under the same considerations that govern prices of other commodities.

In this connection, he warned that whereas "it is our responsibility to see that our price ceilings do not prevent the farmer from getting parity, it is for others to determine whether and by what means parity shall be assured." In other words, parity and price control cannot be mixed.

Mr. Bowles objected, on the ground that it is "special interest legislation," to a rider to the Second Deficiency Appropriation act of 1944 which forbids the use of the established United States standards for processed fruits and vegetables in establishing maximum prices. He has advised the House Appropriations Committee, he said, that there is no practical alternative for securing effective price control.

A word of caution was advanced by Mr. Bowles in reference to the possible effect of the amendment in the existing law which prohibits use of subsidy payments after June 30, 1945, "unless the required money has been appropriated by Congress for such purpose." Failure of funds for this purpose would have disastrous consequences for the stabilization program, he said. "The provisions of the pending Commodity Credit Corp. bills furnish a solution of this problem so far as concern the programs of that corporation. The making of similar provision with respect to programs of the Reconstruction Finance Corp. and its subsidiaries would solve the problem in its entirety," said Mr. Bowles.

Law Delays Criminal Cases

The present law hampers enforceability of the OPA price rulings by making it possible in criminal cases to obtain a stay before trial. This makes for long delays in cases involving black-market operation. "We see no reason for this favored treatment of the person charged with a crime," said Mr. Bowles.

Some of the present exemptions in the price control setup are unwarranted and should be eliminated, Mr. Bowles told the committee.

Mr. Bowles disclaimed any attempt by OPA to regulate profits.

"We have no interest in profits except in cases where a price increase is requested," he declared. "In these cases we are careful to see that the industry earns at least as much as it did before the war. We set a floor under profits, not a ceiling over them. That we have not made any effort to reduce profits to prewar levels is perfectly clear from the fact that profits are several times as high as they were before the war and have risen year by year since 1939." Mr. Bowles at this point introduced the following OPA table showing corporation profits in recent years:

	Corporation Profits (billions of dollars) Before taxes	After taxes	
1929	9.3	8.1	
1939	5.3	4.0	
1940	7.3	4.8	
1941	14.4	7.3	
1942	19.4	8.3	Price control years
1943	24.2	9.9	
1944 (estimated)	24.8	10.0	

Of considerable interest was the testimony of James F. Brownlee, deputy price administrator. He recounted the lessons the OPA has learned from its experience, and described the policies which it has set up as a result. The OPA, he said, has certain standards which "have been developed gradually in the light of experience and are constantly being tested, and their details improved, as we work on one problem after another," said Mr. Brownlee. The purpose, he said, is to meet the basic requirement of the act that maximum prices shall be "generally fair and equitable."

Industry Earnings Standard Is Guide

"The industry earnings standard," said Mr. Brownlee, "is our primary guide in carrying out this requirement. We believe that if prices are to be 'generally fair and equitable,' a price increase is ordinarily required when the earnings of an industry from its operations as a whole, before income taxes, fall below its peacetime earnings, appropriately adjusted for changes in investment." During the past year, he went on, the industry earnings standard principle was approved by the Emergency Court of Appeals in the Gillespie case (Gillespie-Rogers-Pyatt Co. v. Bowles, 144 F. 2d—361), decided in August, 1944.

"The industry earnings standard, however," Mr. Brownlee continued, "is not our sole guide in judging the general fairness and equity of maximum prices. We have thought from the beginning, and our experience has confirmed, that a secondary standard is usually needed in the case of an industry which sells more than one product or line of product. This standard, which was also approved in principle in the Gillespie case, we call the 'product standard.' This is a secondary standard because it comes into play only when the industry earnings standard is satisfied. The standard gives to the industry generally the additional protection of a safeguard against out-of-pocket loss

on any particular product or line of products."

Applications of the product standard for determining the precise amount of a permissible price increase have not yet been numerous but the experience to date shows clearly that there are great variations in the cost patterns of different industries, and even of different products in the same industry. "We cannot hope, therefore, to use just one method of applying the standard without doing injustice in one case and impairing price control in the next.

"In the first place, we can seldom draw a sharp line to distinguish the so-called 'high-cost marginal sellers' from their competitors. What we are obliged to do is to meet the out-of-pocket costs of the industry generally. We do not consider curselves obliged by the standard to meet out-of-pocket costs which do not appear to be representative of the industry's experience.

"Again, we do not believe that, as a working administrative rule, we should try in each case to make an exact determination of what costs are 'out-of-pocket costs.' Out-of-pocket costs are those which would be eliminated if manufacture of the product were to be discontinued. While these are the costs which in principle should be covered, we have found that it is often a matter of serious accounting difficulty to compute them—as, for example, to find out just what part of factory overhead is included. We have come to the conclusion, therefore, that as a working rule we ought ordinarily to use the higher measure of manufacturing costs, although deductions from these costs, or additions to them, will be appropriate in some cases. By then using an average of these manufacturing costs, with or without such adjustment, we are able to cover the out-of-pocket costs for the bulk of the product.

Individual Adjustments Necessary

"Finally, if we are to avoid unnecessarily high price increases, where, for example, some producers have exceptionally low costs, we must be ready to use differential price increases rather than allow an increase to be applied uniformly to the prices of all sellers of the product. By individual adjustments or otherwise, in other words, we shall have to satisfy the standard in some cases by giving a higher price increase to the relatively high-cost sellers than to the relatively low-cost sellers."

The OPA finds in the great majority of cases, said Mr. Brownlee, that the industry earnings standard and the product standard are sufficient guides in determining whether maximum prices are "generally fair and equitable." In special cases, however, additional guides may be needed to make certain that arbitrary or unreasonable action is avoided.

"The principal case of this kind," he explained, "is where a substantial proportion of the output of a product—for example, a third or more—is made by firms which do not make other products. Maximum prices in such a case may satisfy the industry earnings standard only because of the earnings of multiple-product firms on products not sold by the single-product firms. To avoid unreasonable treatment of these latter firms, we would ordinarily approve a price increase which is sufficient to restore the average aggregate base-period earnings either of the single-line firms or of all firms in the industry on the product in question. Unless there is compelling reason to the contrary, however, this increase is limited to the single-line firms who are in need of it."

Try To Eliminate Hardships

A problem also may be presented by single-line firms which are responsible for something less than a substantial proportion of the output of a product. "We have had so few cases of this kind that it is impossible to lay down a general rule for determining the appropriate action to be taken. Within the limits set by the broad purposes of the stabilization laws, however, we intend to use all the means within our power to correct any general hardship and to minimize hardship in individual cases," Mr. Brownlee concluded.

JAMES F. BROWNLEE

As deputy OPA administrator, Mr. Brownlee has played an important role in developing standards for price control. NEA photo

Surplus Property Sales Average Over $1 Million Cost-Value Daily

SURPLUS property is being sold by government disposal agencies at an average rate of more than $1 million cost-value daily, according to the Surplus Property Board. During February, surplus sales amounted to $35,289,000 cost-value, on which the government realized $15,840,000, or 46 per cent of cost.

Inventories of surplus in the hands of six disposal agencies at the end of February amounted to $1,299,340,000, an increase of $99,685,000 during the month. Reconstruction Finance Corp. holds the largest amount, $1,164,537,000. Other agencies and stocks held are: Treasury, $109,803,000; Maritime Commission, $23,075,000; War Food Administration, $83,000; National Housing Administration, $163,000; Foreign Economic Administration, which now has jurisdiction over lend-lease property and aircraft in foreign, noncombat area, $1,679,000.

A flood of surplus material is expected to be offered by the agencies following the defeat of Germany. The government plans to clear this material as soon as possible.

An average of about 50 per cent of cost has been realized on surplus sales to date. On some items, such as housing, practically 100 per cent is realized. On other items, such as worn-out bombers the salvage value is almost nothing, except some scrap aluminum. Almost $900 million of the Feb. 28 surplus inventory consisted of aircraft.

In between these two items is a myriad of articles, many of which can be absorbed by the civilian economy. One of the largest categories is motor vehicles, mostly trucks.

Available now in limited quantities are various types of electrical and communications equipment, scientific apparatus, marine engines, boats, chemicals, and several types of farm machinery.

New Warship Program Reduced 75 Per Cent

The billion dollar "insurance" naval construction program announced March 6 has been reduced 75 per cent, the Navy Department disclosed last week. The schedule which originally called for a new fleet of 84 warships totaling 636,860 tons has been cut to 12 escort carriers aggregating 150,000 tons. Other phases of the Navy's overall construction program were not affected.

Most of the ships involved in the curtailed program would not have been completed until 1946 or 1947.

Industry-Union Leaders Draft "Peace" Charter

"Partnership" aimed at postwar prosperity provides for free collective bargaining, management by management

A LABOR-MANAGEMENT partnership designed to promote postwar industrial peace by throwing off the yoke of government direction and returning to free collective bargaining was effected last week.

The new charter, announced jointly by Eric Johnston, president, Chamber of Commerce of the United States, Philip Murray, president, Congress of Industrial Organizations, and William Green, president, American Federation of Labor, proposes the co-operation of labor and business in working for a prosperous and sustained peace.

Provisions of the 7-point agreement indicated that labor at long last is becoming anxious to rid itself of the government checks and controls which it welcomed a few years ago. The charter emphasizes the right of labor to organize freely and engage in collective bargaining. Equally it emphasizes the right of management to manage, free from "unnecessary governmental interference or burdensome restrictions."

Timing Was Significant

Significantly, the announcement of the labor-management agreement came while Congress was debating the controversial compromise manpower bill which would give the Office of War Mobilization and Reconversion broad authority to regulate the hiring of war workers and freeze them in their jobs. The unions and the Chamber of Commerce have expressed opposition to the legislation.

The labor-management agreement will be presented to the directors of the Chamber of Commerce and to the union's executive boards for approval.

The charter provides the following code of principles:

"1. Increased prosperity for all involves the highest degree of production and employment at wages assuring a steadily advancing standard of living. Improved productive efficiency and technological advancement, must, therefore, be constantly encouraged.

"2. The rights of private property and free choice of action, under a system of private competitive capitalism, must continue to be the foundation of our nation's peaceful and prosperous expanding economy. Free competition and free men are the strength of our free society.

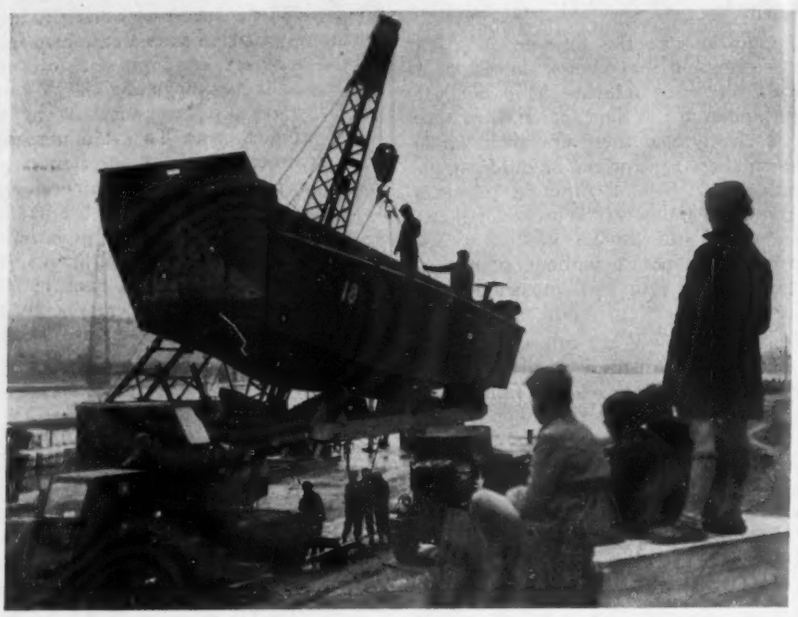
"3. The inherent right and responsibility of management to direct the operations of an enterprise shall be recognized and preserved so that enterprise may develop and expand and earn a reasonable profit. Management must be free as well from unnecessary governmental interference or burdensome restrictions.

"4. The fundamental rights of labor to organize and to engage in collective bargaining with management shall be recognized and preserved, free from legislative enactments which would interfere with or discourage these objectives. Through the acceptance of collective bargaining agreements, differences between management and labor can be disposed of between the parties through peaceful means, thereby discouraging avoidable strife through strikes.

"5. The independence and dignity of the individual and the enjoyment of these democratic rights are inherent in our free American society. Our purpose is to co-operate in building an economic system for the nation which will protect the individual against the hazards of unemployment, old age, and physical impairments, beyond his control.

"6. An expanding economy at home will be stimulated by a vastly increased foreign trade. Arrangements must therefore be perfected to afford the devastated or undeveloped nations reasonable assistance to encourage the rebuilding and development of sound economic systems. International trade cannot expand through subsidized competition among the nations for diminishing markets but can be achieved only through expanding world markets and the elimination of any arbitrary and unreasonable practices.

"7. An enduring peace must be secured. This calls for the establishment of an international security organization, with full participation by all the United Nations, capable of preventing aggression and assuring lasting peace."



TRUCKS CARRY ASSAULT BOATS: Belgian children look on as an LCVP (Landing Craft Vehicle Personnel) is hoisted aboard an army truck to be taken to the Rhine. Hundreds of these craft were manned by Navy personnel in the river crossing. NEA photo

Rules Reconversion Wages Must Hold at War Levels

The question of whether employers will be able to return to prewar wage rates during reconversion was decided last week against the employer by the third regional War Labor Board at Philadelphia.

In a case involving the Richmond Radiator Co. plant at Uniontown, Pa., now partially reconverting to the production of bathtubs, the board directed the continuance of wartime wage rates. "Once reconversion takes place on a large scale, any substantial reduction in rates would result in wide deflation with harmful consequences to the national interest," the board held.

The board members said the case was the first in which the WLB had acted on a request to reduce wages upon reconversion to peacetime production levels. Industry members dissented.

While Sylvester Garrett, chairman of the regional board, admitted there is as yet no national policy he said the "majority of the regional board believe that the board should not in a disputed case order the reduction of wage rates to peacetime levels."

Coal Stocks Low At Steel Plants As Strike Nears

Hope held for delay of general mine walkout as April 1 nears. Sporadic stoppages seen on 1943 dispute pattern

WHETHER a strike would be effected in the coal mines April 1 was uncertain late last week. Hope was expressed in some quarters that even though the miners voted to strike (the vote was reported 8 to 1 in favor of a walkout) stoppage of mining operations would be delayed at least temporarily.

Meanwhile, WPB Steel Industry Advisory Committee announced any stoppage of coal mining will immediately result in a substantial reduction in output of steel. Recent statistics show companies representing 29.4 per cent of steel capacity have only a 10-day or smaller supply of coal, while other companies representing 30.9 per cent of capacity have only 10 to 20 days' supply. The committee emphasized that its only interest in the coal situation concerned itself with obtaining the 106-million-ton coal supply needed annually by the steel industry.

Even though a general walkout in the mines is temporarily averted by government intervention, the belief prevails that sporadic strikes in the coal mines are to be expected from here on until a contract is signed between the miners and operators. This thinking is based on past experience.

Wartime Pattern Established

The pattern is clear. Before the war it was the "no contract, no work" policy of the miners. That since has been modified (on paper) by the no-strike pledge of organized labor, but the wartime pattern was well established in 1943. In that year the shenanigans brought a major coal strike, a shutdown in steel production, and eventually government seizure of the mines. It also brought the miners what they wanted.

Mine operators, seeing the trouble coming, had asked for an earlier starting date for the negotiations. John L. Lewis refused, just as he did a few weeks ago. On the day before parleys started, United Mine Workers released to the press and to the mine operators the demands which were to be made, including a $2 per day increase in wages and portal-to-portal pay. The negotiations wound up in a deadlock, and as the April 1 deadline approached, it became apparent a coal tie-up would seriously hamper war production.

In the final days of March, John R. Steelman, acting for the government, asked that the negotiations be carried forward until May 1, with all settlements to be made retroactive to the April 1 deadline. Coal administrator Harold Ickes last week urged similar action in the current controversy with the same provision.

This step was taken in 1943. Despite this official extension, however, there were numerous strikes, walkouts and work stoppages throughout the coal industry during April. In the closing days of the month, virtually all coal operations stopped, and a general strike began at all points May 1. This was followed by immediate government seizure of the mines and operation. At the same time a general 6-day week was ordered in the mines, with time and a half for all over the standard work week, which in effect gave the $2 increase demanded by the union. The portal-to-portal pay scheme was not approved at that time, but was finally squeezed in later in the year.

Since the same conditions now prevail, most informed quarters expect the same general pattern to follow this year. Government seizure of the mines may come a little earlier than in 1943, because the precedent has been set.

Steel Mills Asked by WPB To Increase Overtime Work

Plans to make available additional overtime work in steel mills for employes willing to accept such work were concurred in by the Iron and Steel Industry Advisory Committee at a recent meeting, the War Production Board reported last week.

Extent to which labor in the steel industry has already shouldered the additional production burden occasioned by a loss of more than 62,000 employes since 1941 is indicated by a jump in the average work week to 47.7 hours in January, 1945, compared with 46.7 hours for the year 1944 and 38.6 hours for 1941, WPB said.

Present, Past and Pending

■ WESTINGHOUSE TO BUILD GAS TURBINE AIRCRAFT ENGINES
PHILADELPHIA—Westinghouse Electric & Mfg. Co. has formed an Aviation Gas Turbine Division for the manufacture of military and later commercial gas turbine aircraft engines.

■ WAR WORKERS FORM POSTWAR PROTECTIVE GROUP
CHICAGO—A war workers' "American Legion" designed to promote "equal rights with war veterans" in the reconversion period was organized here last week by a group of workers in the Buick Melrose Park Plant.

■ KRUG SAYS ARMS NEED IN PACIFIC WILL RISE
WASHINGTON—Supplying American armed forces in the war against Japan will increase, J. A. Krug, chairman, War Production Board, warned last week. Mr. Krug said the Army and Air Forces will have to be "pretty completely re-equipped."

■ NEW TUNGSTEN CONSERVATION ORDER ANTICIPATED
PITTSBUGH—A new tungsten conservation order limiting tool steel alloys to 15 per cent tungsten content is reported being considered by WPB.

■ C. & O. PLANS NEW TURBO-ELECTRIC LOCOMOTIVES
CLEVELAND—Chesapeake & Ohio railroad plans to acquire three coal-burning turbo-electric locomotives of 6000 horsepower each, designed for 100 miles an hour speed in passenger service.

■ KRUPP STEEL USED TO BRIDGE RHINE FOR ALLIES
PARIS—Structural steel from the Krupp armament works in the captured cities of Rheinshoven and Krefeld is being used by American engineers in building bridges across the Rhine to carry supplies to the Allies in Germany.

■ SENATE APPROVES $300 BILLION DEBT CEILING
WASHINGTON—The Senate last week approved legislation, already voted by the House, to increase the national debt limit to $300 billion.

■ METALS RESERVE PURCHASES ALUMINUM FROM CANADA
WASHINGTON—Purchase of an additional 250 million pounds of aluminum from Aluminum Union Ltd., affiliate of Aluminum Co. of Canada Ltd., for delivery before Dec. 1, 1945, has been announced by the Metals Reserve Co.

■ INCREASE IN WORK STOPPAGES REPORTED IN FEBRUARY
WASHINGTON—About 109,000 workers were idle 412,000 man-days as a result of 310 work stoppages in February, Department of Labor reports. This represents an increase over the previous month when 240 work stoppages affected 44,000 workers.

Breakdown of Steel Mill Product Shipments to the Pressing, Forming and Stamping

(Net Tons)

Products	1944*	1943	1942	1941	1940	1939	1938	1937
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	21,000	29,748	38,349	25,925	4,090	.....	.....	52,743
Structural shapes and sheet piling	13,000	25,238	32,428	19,526	15,497	8,032	2,27[illegible]	117,539
Plates (universal and sheared)	244,000	262,124	269,467	170,922	49,828	102,232	12,05[illegible]	
Hot-rolled bars (carbon, incl. hoops and bands)	330,000	294,867	246,647	370,130	167,674	.....	.....	
Concrete reinforcing bars	.....	.....	.....	.....	10,223	19,210	12,98[illegible]	6,648
Alloy bars	172,000	155,739	95,476	133,472	12,515	.....	.....	
Cold finished (carbon and alloy)	45,500	36,967	39,305	85,389	.....	.....	.....	
Total bars	547,500	487,573	381,428	588,991	190,412	172,883	99,14[illegible]	143,000
Pipe and tubes	78,000	71,747	74,138	95,275	51,983	19,398	8,22[illegible]	117,432
Wire rods	36,000	38,197	41,418	75,911	20,419	.....	.....	
Wire and wire products (incl. fence posts)	202,000	133,512	197,978	592,679	208,783	184,983	93,62[illegible]	136,374
Black plate	80,000	58,739	57,169	140,489	93,513	64,444	41,58[illegible]	32,632
Tin and terne plate (hot and cold reduced)	35,000	17,627	28,685	85,784	56,216	.....	.....	
Sheet and strip:								
Hot-rolled	1,027,000	873,813	1,024,577	2,660,396	836,011	.....	.....	
Cold-reduced	536,500	386,606	451,179	1,492,324	505,437	.....	.....	
Galvanized	101,000	55,192	52,796	147,367	125,078	110,761	71,68[illegible]	151,525
All other	.....	21,551	32,276	164,844	92,138	.....	.....	
Total	1,664,500	1,337,162	1,360,828	3,464,931	1,558,664	1,228,223	705,95[illegible]	194,361
Tool steel bars	90	109	869	2,787	660	.....	.....	
Wheels and axles	.....	114	645	1,100	.....	.....	.....	
Forgings	.....	2,399	2,788	459	.....	.....	.....	
Steel Castings	.....	92	305	4,344	.....	.....	.....	
All other steel products	2,025	19,741	30,316	50,374	4,254	57,736	19,92[illegible]	804,521
Grand Total	2,923,115	2,484,122	2,716,811	6,319,497	2,254,319	1,837,931	982,78[illegible]	10,438

*Estimated. Figures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute.

Pent-Up Civilian Needs Brighten Pressed Metal Postwar Prospects

THE WAR has brought about many new developments in metal pressing, stamping and forming operations which should be of tremendous importance to industry in meeting the pent-up demand for civilian goods during the highly competitive postwar period. From the standpoint of accumulated demand industries in this field are assured an extended period of activity.

Two major reconversion problems face industry leaders. The most important is the relationship between costs and selling prices; the second is the promptness with which new tools and dies can be provided for postwar production.

Manufacturers of household appliances, hardware, and other civilian metal goods are confronted with substantially higher wage rates and higher-priced materials than existed in the prewar period. Manufacturers probably will have to raise their selling prices 20 to 30 per cent above prewar levels due to these increased costs.

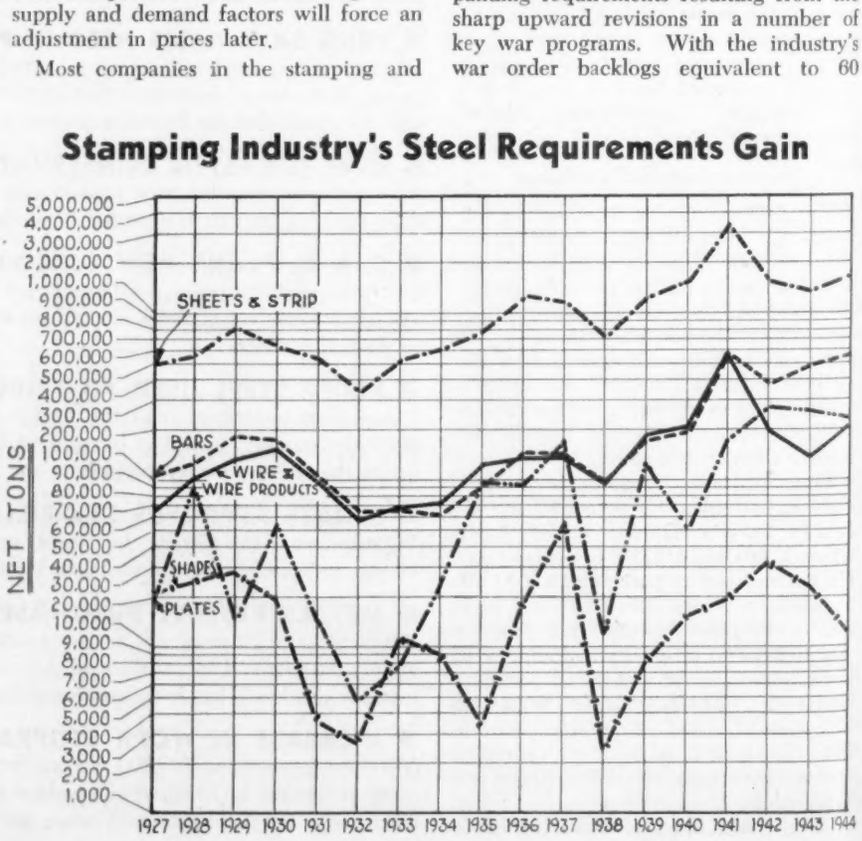
Under present government price regulations, manufacturers must file individual requests for price relief if they find costs are out of line with price ceilings established by OPA. Their contention is that should the green light be given to the production of civilian goods, many weeks would elapse before the numerous requests for individual selling price adjustments could be processed.

There certainly will be a period between war output and full peacetime production when manufacturing costs will be high, and in order to guarantee full employment, manufacturers should be free to set prices at levels which will enable them to weather the transition period. The competitive situation arising from supply and demand factors will force an adjustment in prices later.

Most companies in the stamping and forming industry scrapped their old dies during the early days of the war period when they took on many war contracts requiring dies of entirely different design. Many of the presses for the war effort are largely single-purpose units which would not lend themselves for merchant stamping practice.

The manpower shortage in the tool and die industry is causing considerable concern at the moment, in view of expanding requirements resulting from the sharp upward revisions in a number of key war programs. With the industry's war order backlogs equivalent to 60

Stamping Industry's Steel Requirements Gain



amping Industry by Product Classification from 1927 through 1944

(Net Tons)

1938	1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927
2,27	52,743	18,393	3,301	8,858	10,126	2,626	3,661	19,746	27,742	24,332	20,645
12,05	117,539	94,878	98,390	24,421	7,866	4,734	14,685	53,301	14,765	96,505	18,281
12,98	6,648	726	1,526	844	198	7,152	1,261	1,214	3,379	.	.
99,14	143,000	149,245	93,178	62,540	65,799	64,235	109,945	174,596	185,354	128,045	103,849
8,22	117,432	102,086	80,545	64,248	60,422	43,579	79,543	16,386	40,074	14,521	18,619
93,62	136,374	136,002	126,149	73,275	68,436	56,572	97,533	155,143	137,007	106,018	65,356
41,58	32,632	27,427	25,163	34,324	21,632	16,615	13,169	2,248	14,574	646	37,750
71,68	151,525	155,204	142,860	93,005	104,850	60,091	77,663	67,830	93,850	83,508	51,544
95,95	194,361	1,274,731	897,284	604,153	536,395	346,346	544,994	646,363	812,961	575,462	491,334
19,92	804,521	1,816,621	1,331,771	876,137	775,455	538,205	5,515	30,306	37,481	9,145	604
82,78	10,438	13,860	7,765	4,319	4,780	4,498	869,021	1,098,085	1,269,957	954,673	757,439

to 90 days production at the current rate, and the manpower problem growing more critical, there is considerable concern over the likelihood that the industry's operating facilities may not be adjusted quickly enough to meet the huge new demand for dies, etc., once civilian goods production is permitted. Delay in getting these dies would seriously set back the whole reconversion program of the home appliance and office equipment industries.

The steady downward trend in steel mill product purchases by the pressing, forming and stamping industry since 1941 was reversed last year. The industry's 1944 steel purchases totaled 2,923,115 net tons, compared with 2,484,122 in the preceding year, but were less than half the 6,319,497 tons bought in the peak year 1941.

In 1941 the industry received 10.1 per cent of the total steel produced for sale, but during 1942 the percentage ratio dropped sharply to 4.4 per cent, reflecting the abrupt cessation or curtailment in output of civilian goods. Activity in the industry tended to level off at a somewhat lower pace during 1943 as companies began to take on war work. The downward trend was reversed in 1944. During 1944 and 1943 the industry purchased 4.8 and 4.2 per cent of the total steel product shipments, respectively.

Metal stamping, forming and pressing operations have performed a major role in aiding industry to meet the steadily expanding war production schedules.

Some projectiles today are being stamped and made to greater accuracy with substantial savings in material. Aircraft propeller production was substantially increased by development of presses for swaging one end of tubes.

The size and capacity of presses have steadily increased. Turret top presses, and presses for heavier and longer truck frames are now available. In recent years many specific improvements have been made in press construction such as four point support instead of center support; eccentrics instead of cranks; improved lubrication; triple action instead of double action and increased speed and precision.

Shortage of Repair Parts For War Vehicles Stressed

Constantly increasing war tempo with its wear and tear on all machinery and mobile equipment has created a critical shortage of replacement and maintenance parts, output of which has been lagging seriously behind schedule. Need for increased production of these parts is stressed by all procurement agencies. The problem is primarily one of lack of manpower and the greater emphasis placed by contractors on production scheduling of parts for units to be assembled into an end product rather than for replacement purposes.

February Pig Iron Output Drops Under January Total

Pig iron production in February totaled 4,562,744 net tons, compared with 4,945,018 tons in January, the American Iron and Steel Institute reports. In February, 1944, production was 5,083,013 tons. Output for February this year was made up of 4,506,882 tons of pig iron and 55,862 tons of ferromanganese and spiegeleisen. Blast furnaces operated at 88.4 per cent of capacity, compared with 86.5 per cent in January and 96.3 per cent in February last year.

Prospect of Meeting Ore Shipping Quota Improved

The 1945 outlook for Great Lakes shipping is greatly improved, Senate War Investigating Committee reported last week. Current indications are there will be little difficulty in transporting 83 million tons of iron ore, 2 million above the 1944 movement, and 340 million bushels of grain, against 292 million a year ago, from upper lake ports this season.

The War Shipping Administration will make available for early use 10 of the government's reserve fleet of 36 overage freighters and five more a short time later.

Steel Industry Employment Shows Increase in January

Employment in the steel industry during January, 1945, was slightly above the December, 1944, level, according to American Iron and Steel Institute.

Average number of employes during January was 564,000 against 563,900 in December and 583,120 in January, 1944.

Payrolls in January totaled $150,266,500, including retroactive pay increases.

Wage earners received an average of 123.3 cents per hour in January, compared with 119.7 cents per hour in December of last year and 116.5 cents in January, 1944. Hours worked weekly averaged 47.7 in January, compared with 45.0 in December and 45.7 in January, 1944.

Equipment Redistribution Problem Solved by "Trading Pit" Operation

Newly devised program for transferring equipment from one war production job to another reported working out satisfactorily. Plan, with modifications, may be adapted for disposing of surplus equipment

DEVISED as a means of promptly redistributing production equipment for use in accelerating the manufacture of munitions in thousands of plants, a "machine tool trading pit" has been established by the military services and government production agencies, the Reconstruction Finance Corp. announced.

The "trading pit" is a central supply point, or pool, into which machine tools and production equipment are reported as they become available for transfer from one type of war production into another. Allocation of such tools is determined by a central Board of Review which supervises trading pit operations.

Aside from tools recovered through pit trading operations, all applications—PD-3a (WPB-542)—submitted by the services for new equipment and involving machine tools and production equipment having a unit price of over $3000 are screened against this list and where possible used tools are recommended for substitution.

The national supply of machine tools and production equipment is still short of requirements for war production schedules, and the new trading pit plan is considered a notable contribution toward meeting requirements.

The "trading pit" operates five days a week at the national headquarters of the Reconstruction Finance Corp. in Washington. "Sales" are made on a basis of the urgency of the need for the tools in the war production program.

The plan was developed by RFC with the help of the Army technical services, Navy bureaus and procurement officers, the Maritime Commission, and the War Production Board.

Field representatives of the Army, Navy, Maritime Commission and of the Defense Plant Corp. (RFC subsidiary) inspect plants handling war contracts and report to DPC all government-owned machine tools and production equipment temporarily idle and consequently available for other war work. Such equipment is listed, and kept on record in Washington. Through the contracting officers of the services, war contractors may then draw on the pool for needed machine tools.

The first meeting of the trading pit was held on Jan. 10, 1945, but information concerning the operation was withheld until such time as the agencies concerned believed the plan had proved itself effective in quickly reallocating machine tools to obtain maximum war production. The committee in charge reports excellent results from the co-operative effort. In the past, weeks and even months sometimes elapsed before tools could be released for a different production job. Under the trading pit method, this time-lag is reduced to days, in some cases, hours.

Success of the plan is attributed largely to the delegation of authority to enter into agreements at the trading pit. Representatives of the services possess full authority to (1) release tools under their control for service elsewhere, and (2) to accept tools in behalf of the production requirements for their services.

Surplus Equipment Searched Out

As a prelude to development of the trading pit, RFC last Dec. 22 issued instructions to field engineers to inspect all DPC projects and to report machine tools and production equipment of a critically needed nature that could be made available for other war production. Through March 8 a total of 4463 items have been authorized to be sold, transferred or leased to contractors engaged in war work. At the same time, the board denied applications for the sale of 255 items for which war needs had not been sufficiently demonstrated.

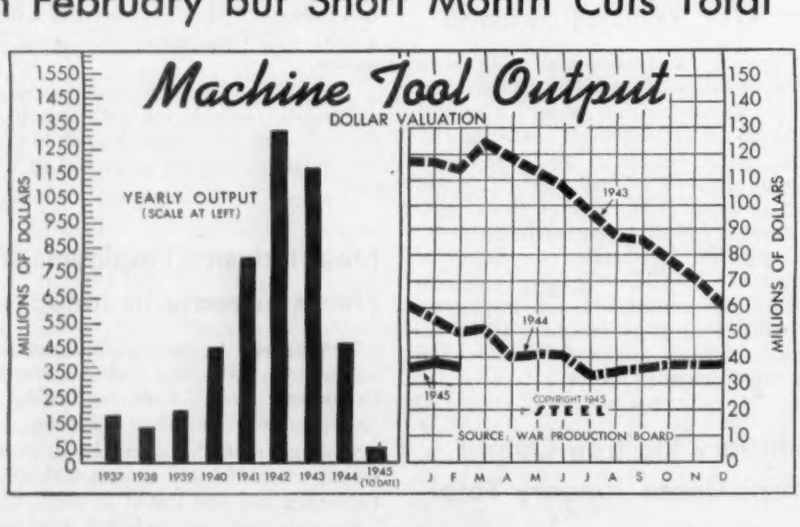
In addition, the Army and Navy have called for listings of machine tools in possession of their lessees which are not needed currently in war production. This equipment is being added to the list for re-distribution.

After the trading pit has served its present objective it is considered likely that the plan, with modifications, may be adapted for screening and filling the applications of the several federal government agencies for surplus production equipment. Under the Surplus Property act, governmental agencies are given priority in applying for certain types of surplus property. The trading pit idea, it is believed, may be used to expedite the settlement of conflicting claims among the agencies, so that ultimately tools may be channeled expeditiously to peacetime production.

An executive committee composed of one representative of the Army, the Army Air Forces, Navy Bureau of Aeronautics, Navy Office of Procurement and Material, the War Production Board, and the Defense Plant Corp., oversees the entire operation. Walter E. Joyce, vice president of DPC, is chairman.

The review committee is comprised of representatives of each of the technical

Machine Tool Shipments Up on Daily Basis In February but Short Month Cuts Total



February machine tool shipments increased 6.8 per cent on a daily average basis, but total output for the short month was off 3.6 per cent to $36,018,000, the War Production Board reported last week.

The industry's employment rose 1 per cent during February to 57,300 persons. However, employment was still 21 per cent below that recorded at the close of February last year.

Net new machine tool orders totaled $58,024,000 during February, or a decline of 1 per cent from January.

Rated unfilled orders at the close of February were valued at $220,445,000, while total order backlogs amounted to $303,445,000, a gain of 7.9 per cent over that registered at the close of the preceding month.

services of the Army, each of the bureaus of the Navy, the WPB and DPC. The chairman of this committee is Roger A. Wilson, chief, Machine Tool Section of DPC. The review committee handles apportionment of idle tools based on supply and demand.

Ordinarily, any controversies arising out of the apportionment of tools are quickly solved on the floor of the pit. For example, four jigs of a certain type were recently put on the available list. Army Ordnance wanted two and the Navy Bureau of Aeronautics wanted three. The committee promptly recommended distribution of two for the Army and two for the Navy, and in a few seconds an agreement was reached. On another occasion, ten tools of a specific design were available for redistribution. Three Army services and two Navy bureaus each reported it could put the whole available supply to instant use in important work. Representatives of the services reached an agreement quickly.

Sheet and Nail Shipments To Warehouses Curtailed

To relieve steel sheet producers' special processing operations on distributors' orders, which can be performed by others than steelmakers, mill shipment of hot-rolled pickled sheets and strip to warehouse interests during the second quarter will be but 50 per cent of the tonnage accepted for delivery in that period.

Not more than 40 per cent of the total tonnage of pickled sheets and strip which a producer is permitted to produce for all distributors in the second quarter may be scheduled for delivery in any one month during the period.

Both of these regulations are contained in the War Production Board's Direction 67 to CMP Reg. 1.

Sheet sellers have notified their warehouse customers of this change in production schedules and the distributors in turn must submit revised specification for plain hot-rolled material within 10 days, or their orders will be canceled to the extent necessary to comply with the terms of the direction.

These terms apply only on orders for hot-rolled pickled sheets or strip accepted from distributors which will be filled from prime scheduled rollings during the period, and to orders for mill accumulations of hot-rolled material to be specially processed by the producer, including pickling, if such material is accumulated or rejected in the plain hot-rolled state.

The mill warehouse load directive on wire nails, beginning in third quarter, is also to be cut to 50 per cent of the old base quotas, further reflecting the tightening steel supply situation.

Any validated allotments of wire nails already placed for third quarter delivery cannot be displaced by the new WPB directive, WH-4-25.

Andrews Steel Denies Company Is Involved in any Possible Merger

Charles H. Stamm, president, says company in stronger position than it has been for years. Plans conservative postwar expansion including contemplated purchase of adjacent government-owned electric furnace plant

ANDREWS Steel Co., Newport, Ky., is not involved in any merger recently rumored as a possibility in the steel industry, Charles H. Stamm, president of the company, stated last week in response to inquiries.

Mr. Stamm said: "While I, personally, and many of my associates of Andrews Steel and its subsidiaries, the Newport Rolling Mill, the Globe Iron Roofing & Corrugating, and the Newport Culvert, have heard lately of these and other rumors, we have, as a matter of fact, classified them much as the editors of STEEL have done (STEEL, March 12, p. 81). We have considered them as being crystal gazing seances, peering into the future—at least insofar as Andrews Steel is concerned. That and nothing more.

"The Andrews Steel Co. is in stronger financial and operating position than it has been for years. We are working at full capacity in all departments and are expecting to continue on this schedule for the duration.

"Our postwar program involves a conservative expansion of facilities, including the contemplated purchase of the electric furnace plant built by us adjacent to our steel mill and at present still owned by the Defense Plant Corp.

"If we should succeed in our efforts, Andrews Steel will then, undoubtedly, face a brighter future even under the most competitive postwar conditions.

"Mergers and consolidations have their place in the scheme of things provided they are built upon a progressive economic and social outlook. Price, volume and quality have always been close economic relatives in all fields. Steel is no exception. However, quality steel is not necessarily an attribute of bigness; it is still largely an art associated with the scientific spirit, designed to serve an ever more exacting market.

"Our organization is like a family. It has grown through more than half a century as a steelmaking guild, as it were, adapting itself to new conditions, yet never abandoning old and time-tested steelmaking ideals.

"Today, when every large and small enterprise is crying for men because the lure of the war has spread them all over the land, our men, workers, foremen, superintendents, engineers and technicians are standing by and doing a large, exacting and difficult job well."

POSTWAR PREVIEWS

LABOR— "Practical partnership" signed by union and industry spokesmen designed to promote postwar industrial peace. See page 76.

LIGHT METALS— Hard and fast rule for disposing of government-owned plant should await clarification of postwar market picture, Senate committee advised. See page 82.

CONTRACT TERMINATION—Prompt settlements help speed production adjustments. Contractors advised to submit claims early. See page 86.

FORMING SCREW THREADS— New method of forming screw threads employs well known principles of the centerless grinder. Simplicity, speed and economy demonstrated by this tested machine point to its adoption in making postwar screw machine products. See page 102.

RUST PREVENTIVES— Wartime developments in corrosion prevention by means of applied coatings or chemical treatments have provided new techniques which promise to be of great value in peacetime product storage and distribution. See page 106.

SHOT FOR METAL PEENING— Increasing demand for improved fatigue resistance in metals and alloys has led to investigation of the shot which are widely used for this purpose. Studies offer a key to economical and widespread use for treating metals in the future. See page 111.

Advises Against "Hard and Fast" Rule for Government Plant Disposal

Aluminum Co. of America spokesman suggests Congress await clarification of postwar market picture before distributing light metals facilities owned by Defense Plant Corp. Disposition to affect government-owned power installations

COMPLEXITY of the problem of disposing of the government's war-built manufacturing plants in such way as to promote industrial productivity and employment after the war was brought out in the light metal hearings being held by the Senate Special Committee on Small Business.

Latest sessions have served to register the ideas and recommendations of the principal aluminum producer, the Aluminum Co. of America, and of a number of other operators of government-owned plants; also of representatives of the Tennessee Valley Authority and the Bonneville Power Administration. (For digests of the recommendations at the previous hearings please see STEEL of March 12, p. 82 and March 19, p. 86.)

Hard and fast rules for the disposition of government-owned aluminum plants should not be made until a clearer picture of the postwar markets develops. This is the opinion expressed by I. W. Wilson, vice president in charge of operations, Aluminum Co. of America, before the committee.

"Until the peace treaty is made, it is impossible to know the extent to which the United States must maintain a military establishment in the postwar future," said Mr. Wilson. "The future requirements of the government's military program for aluminum may be large or may be small or may be something in between. The government may want to keep some aluminum plants as standby facilities, or the military program, with civilian markets, may be such as to require their operation."

Uncertain About Germany, Japan

Another reason for postponing the formulation of policies is the uncertainty as to the status of the aluminum industry in Germany and Japan under the terms of the peace treaty; if those countries are not producers our possibilities for doing an export business in aluminum should be enlarged.

The third reason for such postponement "is that no one can accurately estimate the value of these plants until there has been an opportunity to ascertain with some degree of accuracy the extent to which markets for aluminum can be developed in the postwar period. The aluminum industry is optimistic about its future but no one familiar with the business would think of minimizing the difficulties ahead. In 1939, America produced approximately 327 million pounds of aluminum. In the postwar era, privately-owned plants will have a capacity of a billion pounds per annum and, in addition, there will be government-owned plants with a capacity of 1.3 billion pounds per year. Obviously, vast new markets must be created.

"Alcoa has found in many instances that it could only introduce aluminum in a new product by itself first going into the business of manufacturing the product and then, after the pioneer work was done, turning the product over to a manufacturer who would go ahead with the production."

In commenting on Alcoa's attitude toward competition in the aluminum industry, Mr. Wilson explained that the basic patents on virgin aluminum production expired in 1909, so that any one has been free to go into this field since then. Until 1941, Alcoa was the sole producer of virgin aluminum; since then it has given its competitors technical assistance and has supplied them with a substantial part of their alumina requirements. On at least one occasion it supplied bauxite to one of these competitors, the Reynolds Metals Co.

Alcoa, he said, is developing its business "in pursuance of the theory that competition is indeed the life of trade".

When Mr. Wilson was asked to explain Alcoa's views with respect to foreign cartels, he said it first would be necessary to define the meaning of the term.

"We believe that if the foreign cartel merely consists of a group of companies in the industry that have combined their resources so as to effect an integrated operation—and nothing more—then the American industry should and can compete with them successfully.

May Need Defense Mechanism

"On the other hand, if the foreign cartel consists not only of a group of companies engaged in the production, fabrication and finishing of aluminum, but also has the active assistance of a foreign government which underwrites its losses or grants it subsidies, then we believe it will be necessary for some kind of a defensive mechanism to be devised to protect the aluminum industry in this country against the competition of such a foreign cartel.

"At the present time it is impossible to say what kind of competition the aluminum industry in America must meet in the postwar foreign markets from foreign producers subsidized or owned by their governments. It seems to us best to await developments and devise de-

Laying down a "hard and fast" rule by Congress for the disposition of government - owned aluminum plants at this time would be unwise, I. W. Wilson, right, vice president, Aluminum Co. of America, warned the Senate Small Business Committee. Mr. Wilson suggested that the distribution of light metals producing facilities should await clarification of the postwar market picture. NEA photo

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

New ideas in highway busses include: separate engines for each driving wheel, hydraulic transmission, increased use of aluminum, 50 passenger capacity, two decks, wider treads and steam power. *Business Week.*

get ready with CONE for tomorrow

A new process deposits a ceramic insulating covering on electric wire. *Sprague Electric Co., N. Adams, Mass.*

get ready with CONE for tomorrow

A new storm-proof wire for rural electrification is made of steel wire covered with copper. *American Steel & Wire Company.*

get ready with CONE for tomorrow

About 10% will be added to the country's cold storage capacity if plans to use a 12 million cubic foot limestone mine for that purpose are successful. *Food Industries.*

get ready with CONE for tomorrow

"Molecular distillation" is now out of the laboratory stage and promises to do such incredible jobs as to separate fish oil from its smell. *McGraw-Hill Overseas Digest.*

get ready with CONE for tomorrow

A hardware wholesaler carrying 50,000 items plans to set up a chain of "cafeteria style" hardware stores after the war. *George Worthington Co., Cleveland.*

get ready with CONE for tomorrow

Claims for the new home heater developed by the Bituminous Coal Institute include: one-third reduction in fuel use, 50 hours of heat in one stoking, cost under $100. To parallel this development, Anthracite Industries Inc. has a furnace 2 x 3 x 3 feet that weighs only 75 pounds. It consists of a tube with the coal entering at one end and ashes forced out at the other. *Coal Age.*

get ready with CONE for tomorrow

A new surgical lamp projects a cone of ultraviolet radiation, through which germs cannot pass, around the wound. *Hanover Chemical & Mfg. Co.*

One of the large oil companies announces a motor lubricant claimed to be unaffected by temperatures from 100 below to 200 above zero. *Cities Service Oil Co.*

get ready with CONE for tomorrow

A new stirring device is driven by an extended motor that revolves the internal rotor by magnetic attraction. *Ohmite News.*

get ready with CONE for tomorrow

A large trucking company, operating in eleven states, plans to add air freight service as soon as planes are available. *All States Freight Inc.*

get ready with CONE for tomorrow

A chemical company has produced a solution which, it claims, will prevent runs in stockings and may be applied with a sponge. *Monsanto Chemical Co.*

A flashlight, in which battery, bulb, and lens are cast in a cylinder of wax, is said to be cheap enough to throw away when its batteries are exhausted. *Geyaun Manufacturing Co., Charlestown, Mass.*

get ready with CONE for tomorrow

The electron micro-analyzer reports on the atomic composition of particles too small to be seen by microscopes. By its use the point of a common pin can be made to look as vast and rough as a mountain range. *Optical Society of America.*

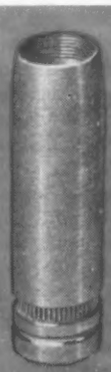
get ready with CONE for tomorrow

In war planes the present type of engine is twice as efficient as jet propulsion at 150 miles per hour; the two are equal at 300 miles; and at 550, jet propulsion is twice as efficient. *EMPIC No. 7.*

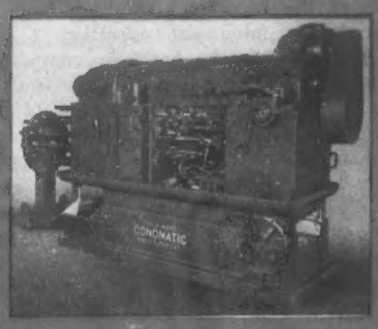
get ready with CONE for tomorrow

Steam busses, now being designed, appear to have many advantages, including smooth operation, no idling, no fumes, low operating cost, engine braking, and longer service between overhauls. *Bus Transportation.*

Automatic Production at automatic-cannon speed



The 1⅝" 8-Spindle Conomatic produces these 20mm. tracer bullets in 8 seconds each. Production like this keeps shell supplies ahead of the requirements of rapid firing guns. Conomatics, in wartime, are a military necessity — in peacetime, an economic necessity.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

16

fensive measures when we know the thing against which we must defend ourselves."

The smelting of aluminum metal and the semifabrication of aluminum are mass production jobs which call for large installations and large capital investments. But the manufacture and sale of finished aluminum products hold unlimited opportunities for small business enterprises.

Mr. Wilson handed to committee members a list of some 2000 articles in which aluminum is the chief material. Most of them, he said, can be manufactured in small shops.

One of the problems with which Alcoa is preoccupied, said Mr. Wilson, is that of creating a market for semifabricated aluminum produced in the Pacific Northwest; the aircraft industry which is the largest aluminum consumer in that territory at present probably will take only a fraction after the war of what it is taking today. After mentioning the several aluminum smelting plants which are located in that area and which enjoy low-cost power, Mr. Wilson said it is Alcoa's belief that postwar markets sufficient to attract and maintain aluminum semifabricating plants can be developed in that section.

Sees Advantages of Mass Production

Mr. Wilson saw great social and economic advantages the mass production operations made possible by large investments in integrated companies equipped to make semifabricated material available to small enterprises at the lowest possible price.

"In the same way, the aluminum industry can contribute most to the social welfare and economic well-being of the country when it can furnish small business enterprises with their raw material, in this case semifabricated aluminum, at the lowest possible price, namely, at a price that passes on to small business men the economies that result from the mass production by an integrated aluminum company.

"Further, any American aluminum company will find it difficult to compete successfully in the world's aluminum markets of today unless it has the benefits of the economies resulting from a large-scale integrated operation. . . . This is because the American companies must compete with aluminum manufacturers in Europe and other parts of the world who are either integrated in this manner or have achieved substantially the same result by agreements."

Development of commercial markets for aluminum, Mr. Wilson said, has been largely by replacing older and better known metals and materials.

Mr. Wilson went into some detail in describing the approach in promoting use of aluminum. In creating and expanding markets, he said, emphasis is placed on one or more of the 12 characteristics of the metal: Light weight, high resistance to corrosion, high electrical conductivity, high heat conductivity, high reflectivity for light and radiant heat, workability, non-toxicity, strength in alloys, non-sparking, nonmagnetic, appearance, high scrap and re-use value.

MOBILIZING WORKERS: A series of radio programs designed to keep war workers on the job and to recruit new workers is being sponsored in Chicago by a group of metalworking and metal producing companies. The sponsors and their products: Republic Steel Corp., making ammunition; Pressed Steel Car Co. Inc., tanks; Ingersoll Steel & Disc Division, Borg-Warner Corp., ammunition; Aluminum Co. of America, landing mats; Electro-Motive Division, General Motors Corp., diesel engines; Western Electric Co., communication equipment; Buda Co., diesel engines and transportation equipment; and Hallicrafters Co. radio equipment

Bonneville Power Administration representatives came before the committee with a carefully prepared program.

"Northwest government aluminum plants are modern and can be among the lowest-cost producers in the country. About half of our power revenues come from aluminum. The outlook for the government plants, therefore, will have a serious effect upon our power program," said Dr. Paul J. Raver, Bonneville administrator. "The question of vital interest to us is whether disposal of the government-owned aluminum plants in the Pacific northwest can be handled so as to encourage another primary producer or two, or whether the plants will be shut down."

Will Co-operate With Alcoa

Bonneville's largest customer is now, and probably will continue to be, the Aluminum Co. of America, said Dr. Raver. "Whatever happens," he said, "we intend to co-operate with Alcoa. Yet we would prefer to see the government make a deliberate and sustained effort to bring additional new blood into the primary production of aluminum."

The problem of disposal is made difficult by certain decisions by the government during the war, said Dr. Raver; "Our studies show that only Alcoa may ultimately have incentive to take over some of the basic government plants, and then only a small portion of the total government capacity right after the war." Only Congress, he said, can change this outlook.

First, he said, our government helped the Canadian producer, with purchases of aluminum at a high price and favorable loans sufficient to cover the cost of the $69,000,000 power project at Shipshaw.

"Based largely on Shipshaw," said Dr. Raver, "the Canadian company now has an aluminum capacity of 1 billion pounds; that makes it larger than Alcoa. The favorable financial terms given the Canadian company should help it produce at lower cost than American plants."

Another group of decisions that will handicap disposal of government plants dealt with the capacities and locations chosen for some plants, said Dr. Raver.

The program which Dr. Raver recommended on behalf of the Bonneville administration is:

1—New private operators should be encouraged into aluminum production.

2—They must look abroad for permanent high-grade bauxite reserves and the government should help them in these four ways:

a—Give them access to high-grade imported bauxite on the same favorable terms which the government can obtain if it builds up a national defense stockpile as recommended by the Army-Navy Munitions Board; b—Give them access to bauxite found in Pacific areas to be transferred from Japanese to American control; c—Release the present government stockpile of medium-grade bauxite in Arkansas for use by any operator of the government's Hurricane Creek plant, and investigate the amount of additional medium-grade ore that can be made available in order to utilize

fully the Arkansas ore; d—Lease the Hurricane Creek alumina plant on terms that will make alumina available near cost to any operator of a government-owned reduction plant.

3—The government for a limited period should guarantee purchase of a portion of the output of private and government plants to provide a minimum market for the operators and at the same time create the national defense stockpile recommended by the Army-Navy Munitions Board.

4—The government should furnish engineering guidance to prospective operators in appraising production costs at partial operation, should grant flexible terms of lease with rental conditioned upon profitable operations, and assume the cost of altering plant facilities and relocating improperly located plants and equipment.

5—The government should grant operators of reduction plants preference in the purchase or lease of fabricating plants to give them needed fabricating outlets.

6—Finally, the government should release surplus stocks of virgin and secondary aluminum in such a way as not to interfere with price levels.

To carry out all these provisions, Dr. Raver recommended creation of a temporary Aluminum Board or Commission.

Final Decision Considered

This program, said Dr. Raver, takes into consideration the final decision in the antitrust case against Alcoa. "The court declared that Alcoa was a monopoly and that the remedy to be obtained by the government depended on whether the Surplus Property Board was able to create competition in the production of primary metal through the disposal of government plants," he said. "If the board does not do this, then the district court will be expected to create competition, if necessary, through dissolution of Alcoa. It seems to me, therefore, far more constructive for the government to take positive action to create a reasonable competitive situation to expand production and lower price with its war facilities than to break up an efficient company."

Bonneville believes that many large companies in other lines of business might be interested in operating government aluminum plants, said Samuel Moment, Bonneville's market analyst.

"It appeared to us that some of the best candidates for entrance into the aluminum industry are those that had mined, processed and fabricated metal and products containing metal, and those that had large marketing organizations," said Mr. Moment.

Inasmuch as Alcoa and Reynolds together now have three times the prewar capacity of Alcoa alone, it will take a few years for their capacity to be fully used. Adding the capacity of the government plants to the Reynolds and Alcoa plants, said Mr. Moment, it becomes apparent that one of the biggest jobs to be done to solve the aluminum problem is to educate new users of the metal. The other big problem is that of obtaining high-grade bauxite.

Of the nine government aluminum plants, said Mr. Moment, four and one-half plants will have to be written off because of high power costs after the war. He arrived at this conclusion as follows: "We estimate that cost may not be over 10 cents per pound, including 8 cents for production at the plant and not more than 2 cents for transportation and general overhead and selling costs. The present price of pig ingot is 14 cents which would allow a 40 per cent maximum profit. But a new producer ought to anticipate the possibility of a decline in price at least to 12 cents per pound. The price may even go lower temporarily if the markets are flooded with the surpluses of secondary metal and battlefield scrap. We conclude that any government plant that cannot produce metal at a total cost of 10 cents delivered to market will be uneconomical and will not attract new operators."

The plants that can "possibly" operate economically after the war are Massena, N. Y., half of the Jones Mills, Ark., plant, and three plants in the Pacific Northwest, which can obtain low-cost power and which can get along if they can obtain alumina at a cost competitive with Alcoa. The Massena plant, he went on, might be attractive only to Alcoa which could supply power from its plant next door. The economical half of the Jones Mills plant, he said, would be attractive to an independent operator only if he could obtain his alumina from the nearby Hurricane Creek plant.

Couldn't Operate Economically

There are no prospects at this time that the aluminum plants at Brooklyn, N. Y., Los Angeles and Modesto, Calif., and Burlington, N. J., can be operated economically after the war, he said.

Representatives of the Tennessee Valley Authority who were called to advise the committee offered no suggestions for postwar operation of government-owned aluminum facilities in their territory. Rather, they were concerned with such opportunities as may accrue to small business through the use of aluminum produced in the TVA area.

Only large companies could engage in primary production after the war, said John P. Ferris, director of TVA's commerce department. Economic production of alumina or aluminum or of rolled aluminum sheets or extruded bars, he said, will require companies capitalized at $10,000,000 or more. The only opportunities that will be open to small companies, he said, will involve production of fabricated aluminum products and castings.

For such a development to gain momentum, however, said Mr. Ferris, it is necessary that prevailing freight rate differentials be adjusted.

Olin Industries Inc., East Alton, Ill., according to F. S. Elfred Jr., general manager, is not now interested in postwar use of the Tacoma, Wash., aluminum plant it is operating for the Defense Plant Corp.

"Under normal economic conditions, and with the diversification of our corporation, we would be interested in continuing in the aluminum business," he told the committee. "But pertinent facts relative to raw materials, economic conditions, and the tax situation must be known or ascertainable prior to any commitments on our part anticipating the purchase and operation of a government-owned facility."

A feeling, "developed from research work and many contacts," has led J. O. Gallagher, president, Columbia Metals Corp., Seattle, to the belief that the pig aluminum capacity of Alcoa, Reynolds and the "live" plants of the Defense Plant Corp.—1,611,000,000 pounds—will prove inadequate to meet the demand within five years after the war. Consequently, Mr. Gallagher told the committee, Columbia proposes to establish an alumina-from-bauxite plant in the Pacific Northwest as soon as tidewater bauxite can be obtained. The corporation has requested the privilege of exploring certain overseas bauxite reserves as soon as military activities permit.

Recommends Completion of Plant

Coy Burnett, president, Monolith Portland Cement Co., Los Angeles, and H. D. McBride, manager of the company's Oxide Division, appeared before the committee to recommend that the DPC plant they now are constructing at Laramie, Wyo., be carried to completion and the original research project there pursued.

Another alumina-from-clay project whose program should be pushed to successful conclusion is the DPC plant which will be ready for operation in several months at Harleyville, S. C. W. G. Hubler, vice president, Ancor Corp., which is building the plant for the DPC, said the Ancor process was undertaken in 1937 under the sponsorship of American Nepheline Corp. (whose initials constitute the name) and underwent pilot operation at the Canadian Bureau of Mines at Ottawa. It requires three raw materials: Clay or other aluminous material; high-calcium limestone; and fuel, which may be coal, natural gas, fuel oil or electricity if the latter is offered at a sufficiently low rate. The present plant is laid out to produce 50 tons of alumina per day but can be enlarged for commercial production. Residue after production of alumina can be used to make Portland cement, and also a product to correct soil acidity.

Prompt Contract Settlements Help Speed Up Production Adjustments

Period of settlement of terminated contracts cut to four months. Still room for improvement, there being 2715 terminated contracts unsettled as of Feb. 28, most of them because contractors had not submitted claims

By D. N. HAUSEMAN
Brigadier General, General Staff Corps
Director, Readjustment Division

BRIG. GEN. D. N. HAUSEMAN

THERE IS increasing realization in industry, as well as in the War Department, that prompt settlement of terminated contracts and quick clearance of plants is an integral and essential part of war production. Without this ability quickly to adjust production to meet new equipment needs developed by battle-experience, we should not now be winning battles all over the world. To keep essential war production flexible and fluid we terminate certain contracts for material no longer needed in order that we can release facilities to produce better material which is needed by our fighting forces.

This is why the Readjustment Division which makes War Department policies for contract settlement is interested in new ways of speeding the settlement process. In the last few months we have forged new tools to do this job and we are ready to place these tools in the hands of contractors who have a large part of the job to do. Settling contracts is not a one-way street. It calls for contractors to play their part, because the War Department cannot settle a case until the case has been presented by the contractor for settlement.

For a long time, settlements were damming up because contractors did not get in their claims. It used to take from six to eight months on the average to settle a case. As contractors and Army absorbed more experience and improved the ground rules, this period of settlement was decreased until about a year ago it was taking five months. Today that period has been reduced to four months. Contractors have done an excellent job but there is still room for improvement.

The most essential factor in contract settlement is *time*. Every day counts because this time is worth money to industry and to the nation. If plants are clogged with termination inventory and if contractors' financial position is frozen by outstanding settlement payments, the contractor is in a poor position to engage in other production.

As of Feb. 28 there were 2715 terminated contracts still unsettled. This represented a dollar value of $2,982,488,000. Out of these 2715 unsettled cases, 2101 remained unsettled because contractors had submitted no claims. The pay-off in dollar volume on this factor is this: Canceled commitment value of $1,951,173,000 awaits contractors who have submitted no claims to obtain it.

Closer examination of these figures reveals that some of these unsettled contracts were terminated over twelve months ago and still no claims. For example, as of March 1, 126 were terminated from four to six months ago (and this number represents $466,000,000) and still no claim!

Contractors cannot prepare and submit a claim in no time flat. It cannot be done in a day or two. But it is possible to reduce the time of settlement below four months by using several new tools now ready.

Pretermination Agreements Help

Perhaps the most trenchant tool is Pretermination Agreements. This is a simple and obvious tool. Pretermination Agreements are simply this: We can negotiate a settlement of a terminated contract before it is terminated instead of after. The settlement of a terminated contract is merely a matter of making decisions. The contractor agrees to do certain things and the government agrees to do certain things. Experience has shown that many of these decisions can be made *now* and not only made now but set down in a binding formal agreement now. We call this the cold-storage plan because if we can draw up a written agreement and put it in the safe, we can haul it out later and use it if the contracts are terminated.

What do Pretermination Agreements mean in terms of speeding up a settlement? Simply this: There are two parts to settlement, making decisions on the fiscal details and making decisions on what to do with the termination inventory. If we can make many decisions on fiscal details today, we won't need to make them after termination. If the contractor and the government can make decisions today on what each will do about the disposition of termination inventory, we won't need to make those decisions after termination. Thus it is possible, by use of Pretermination Agreements, to shorten the time of settlement under four months.

One case, for example, is a large plant that was cleared of termination inventory, not in sixty days (which is the period allowed) but in just seven days flat! Think what that means in terms of releasing a plant for other production.

What is the other tool that will speed up the settlement process? It is delegation of authority by the War Department to prime contractors allowing them to approve their subcontractors' claims under $10,000 without submitting these individual claims to the War Department. This device will save time because individual submission and approval takes time. If a prime contractor is armed to give spot approval of his subcontractors' claims under $10,000 he can save precious weeks.

The War Department will consider giving this delegation of authority to all prime contractors whose record demonstrates that they are in a position to make the best use of it. As of Jan. 31 only 1947 prime contractors applied for and were given this delegation of authority. This is between one and two per cent of the prime contractors on the War Department list.

All prime contractors are not in a position to use this tool because many of them do not have any subcontractors, and for other reasons it is not a universal panacea, nevertheless, more prime contractors can and should avail themselves of it.

Also on tap, another valuable aid for speeding settlement, is a joint effort with the Navy. This is a new streamlined four-hour training course to train personnel in every contractor's office with the "know-how" of preparing a claim on the proper government forms. Every contractor should avail himself of this training because until he or someone in his office is able to prepare a proper government form, his settlement cannot be undertaken.

Everything possible must be done to shorten the settlement period, not only in the interests of war production but in the interests of preparing ourselves by practice and precept to do the job quickly when war production is no longer the great urgency it is today.

This article was written especially for STEEL by General Hauseman. In it he stresses the importance of prompt settlement of contracts and points out the tools open to contractors in speeding completions.

These tools, such as pretermination planning and delegation of authority, are ready but the contractor has to reach out his hand and take the tool out of our tool box. We haven't got the time and we haven't got the personnel to distribute these tools to every contractor. He alone knows his particular problem and if he feels he can make use of these tools let him reach out his hand and we will lay a tool in it.

Contract Renegotiation Yields $5,800,000,000

As a result of renegotiation of war contracts in the past three years, contractors have refunded or agreed to refund more than $5,800,000,000 of excessive profits to the United States Treasury, Col. Maurice Hirsch, chairman of the War Contracts Price Adjustment Board, has announced. For the most part the cash refunds reflect renegotiation of prices for the business of contractors in 1942 and 1943, and the savings resulting from the authority to renegotiate war contracts are of three types: Refunds, price reductions under existing contracts, and contractors' voluntary price reductions on future contracts.

Metals Reserve Co. Issues First Progress Report

Created in June, 1940, to stockpile critical metals and materials, Metals Reserve Co. has expanded its program for the purchase and stockpiling of two commodities—tin and manganese—to include 49 major classifications of commodities. Transactions cover 51 foreign countries and foreign territories, 38 states, and Alaska and the Philippines.

Some highlights of the first wartime progress report of Metals Reserve Co. follow:

Chrome represented one of the earliest strategic metal problems facing the war industries because domestic production is normally only 2 to 3 per cent of requirements. By the middle of 1943 it was ascertained production from two domestic low-grade areas could, if necessary, meet 50 to 60 per cent of the greatly expanded war requirements.

The production of copper for the war program during the years 1941-1944 was by a wide margin the greatest production of copper during any four-year period in this country's history.

Tin, never produced by the United States in quantity sufficient to fill one per cent of the nation's requirements, is stockpiled now in quantity to take care of one year's requirements.

Prewar production of manganese was approximately 35,000 to 40,000 tons per year; production in the Butte, Mont., area alone now has reached 100,000 tons a year.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

ELECTRONIC TUBES: Direction 7 to CMPR-3, issued March 20, provides that no producer of electronic tubes may use the preference rating assigned to him for his authorized production schedule to obtain electronic tubes from any other producer for resale to round out his line.

M ORDERS

ASBESTOS: Increase in the available supply of asbestos, due largely to reductions in military requirements, has permitted relaxation of Order M-79 to allow consumers their choice in the use of grades C & G 1, 2 or 3 asbestos. (M-79)

ELECTRIC MOTORS AND CONTROL EQUIPMENT: Rated orders for electric motors and control equipment needed for specific war uses must be identified according to the ultimate end uses for which the items are required. Items of equipment requiring identification are: fractional and integral horsepower motors and generators (except specifically designed airborne types), electric motor control equipment, small air circuit breakers, aircraft switches and circuit breakers, and panel boards rated 600 volts or less for lighting and power distribution of the wall-mounted type for shipboard use. Purchases of items of other equipment containing these electric motors or controls also must be identified. Identification must be furnished with each order for items placed in the future by any ultimate user, and as quickly as practicable for each order already placed. (Direction 1 to Table 6 of M-293)

PRICE REGULATIONS

MACHINERY AND TRANSPORTATION EQUIPMENT; MACHINES, PARTS AND INDUSTRIAL EQUIPMENT: Two major steps taken by OPA to simplify pricing of machines, parts and industrial equipment, industrial services and industrial machinery repair services are: 1. Revision of MPR 136, simplifying the phraseology, and 2. Establishment of a new regulation (MPR 581) for industrial services which provides suppliers of industrial services and industrial machinery repair services with a single simplified regulation. (RMPR 136 and MPR 581)

EVAPORATIVE COOLERS: Manufacturers of evaporative coolers are eligible for individual price increases if they fulfill the requirements under which such increases may be granted. (MPR 188, Amendment No. 51)

PREFABRICATED NON-DWELLING STRUCTURES: MPR-583 has been issued by OPA to provide each of four classes of sellers of prefabricated non-dwelling structures with a specific formula for pricing them. Non-dwelling structures covered by the new regulation are made principally of lumber products. Structures made mostly of metal, brick, cast stone or concrete are not covered by this regulation, nor are items such as silos, tanks and mechanical farm equipment, unless sold as an integral part of a prefabricated structure. (MPR 583)

RESALE OF IRON AND STEEL PRODUCTS: Amendment 30 to RPS 49 permits OPA to make allowance for industry-wide increases in maximum prices at the mill level when setting prices for direct mill shipment of special named steels differing in chemical analysis and quality from standard mill specifications on which the seller takes the responsibility of performance.

The amendment defines deliverd base price as: (1) Mill base price to a consumer; (2) Rail rate of freight for the quantity sold, from governing basing point to holder's location of material. "Governing basing point" in this instance means that established basing point the use of which results in the lowest delivered price at the holder's location of material: Provided, that in the case of oil country tubing, casing, drill pipe and drive pipe, the charge that the holder paid or would have had to pay a commercial trucking company for transporting the material from the railroad siding located nearest the holder's location of material to the holder's location of material also may be included; and (3) actual transportation costs paid for delivery from holder's location of material to destination. "Destination" means the place at which the material is required for the buyer's operation. (RPS 49)

PRIORITIES REGULATIONS

MALLEABLE IRON CASTINGS: A limited volume of malleable iron castings needed in the production of farm machinery and equipment will be uprated to AA-1. Manufacturers who apply to the Farm Machinery and Equipment Division, WPB, for AA-1 assistance should give the following information: Suppliers' names and addresses, order numbers, dates on which the orders were placed and on which delivery is required, dollar value and tonnage of orders, item of equipment into which the castings will be incorporated, and number of items that will be completed from the castings on each order.

Hot Topped Steels Needed for Shell Forgings

Failure to obtain sufficient tonnages of "quality" (hot topped) steels for shell forgings may endanger fulfillment of the Army's ammunition program, War Production Board officials told members of the Metallurgical and Operations Industry Advisory Committee at a recent meeting.

Present quality steel requirements for all products are estimated at about 2,480,000 tons monthly compared with estimated current monthly capacity of 2,200,000 tons. New equipment is expected to add 150,000 tons monthly of quality steel production, reducing the deficit in requirements to about 130,000 tons monthly. Further increases in hot topping facilities are absolutely essential, therefore.

Overall carbon steel allotments totalled 14,309,000 tons for second quarter, equal to 103 per cent of expected supply, while alloy allotments were established at 2,099,200 tons, or 120 per cent of expected supply.

Surplus Property Board Forms Advisory Council

Surplus Property Board has established an advisory council of 19 government agencies through which those agencies can present their views to the board on matters relating to the disposal of surplus property.

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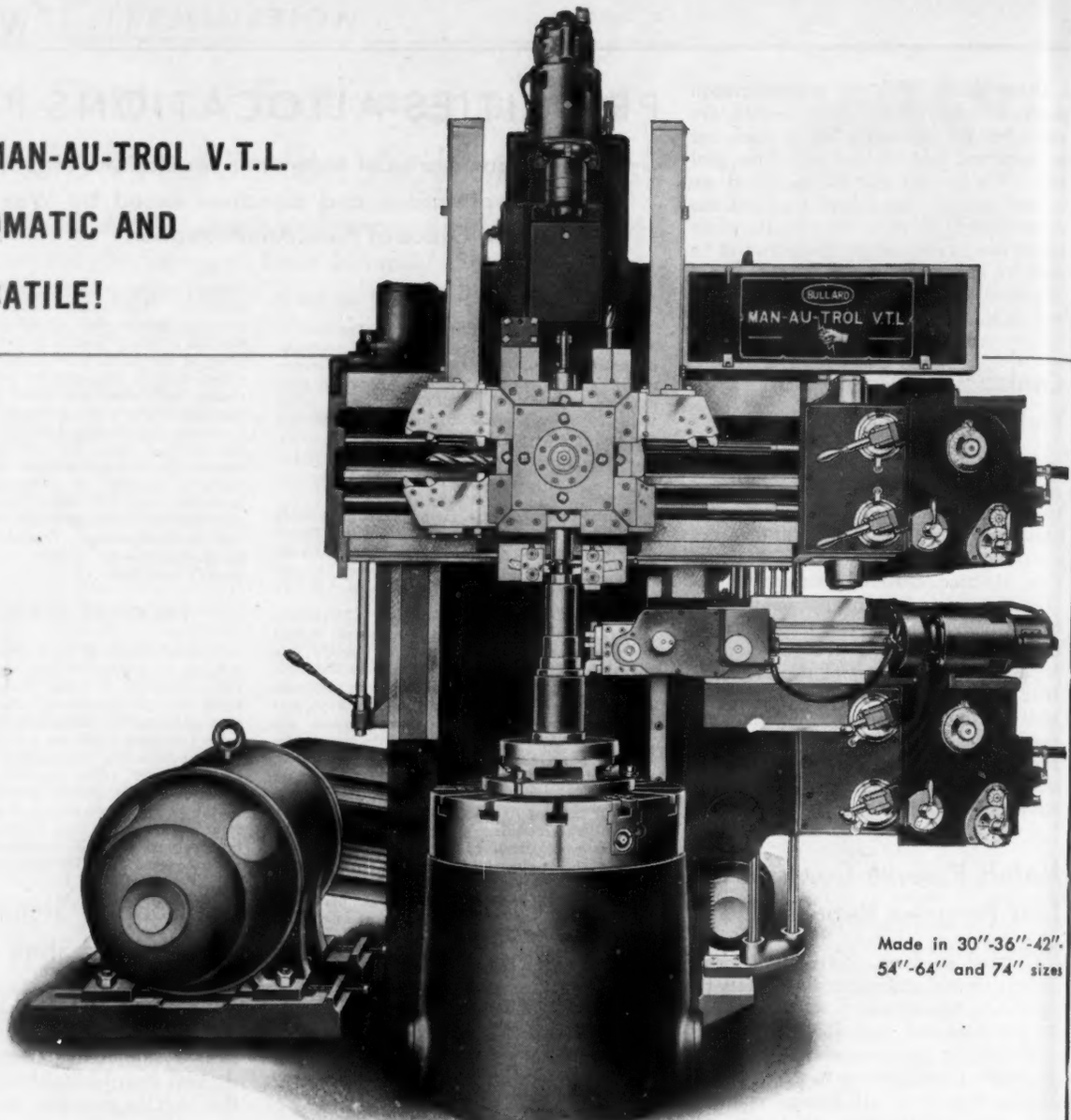

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BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Increased preparatory activity hints resumption of civilian automobile manufacture. Several shops busy on new fender dies. Cost of equipment up sharply. Labor Relations Board reverses self in foremen's case decision

DETROIT

WHILE it continues difficult to uncover specific details, a noticeable quickening of preparatory activity in respect to eventual resumption of automobile production is evident to anyone who keeps an eye peeled on the straws floating by in the spring breezes around this metropolis. For instance, several of the large die shops, which operate the Keller-type duplicating machines are now busy on automobile fender dies, and the preponderant opinion is this is all "new stuff."

Fender dies are usually the first tools to get under way as a new model season approaches, for the reason they take the longest time to complete. Hence it is logical to see some in process at the moment. The fact such dies are being ordered also suggests some car builders are not going to continue with their 1942 style fenders, since the 1942 dies are still available and remain in good shape since they saw only about five months production.

In prewar years around 1939 a set of front fender dies, comprising about eight pieces in all, for both right and left hand fenders, cost around $55,000. The eight pieces involved in a set of right and left hand rear fender dies, a somewhat simpler stamping, usually figured around $30,000, thus making $85,000 for a complete set of dies for all four fenders. How different the picture is from a cost standpoint today may be judged from the report of a cost estimate on a single set of front fender dies amounting to $100,000, or an increase of better than 80 per cent.

Cost of Auto To Be Higher

This is a pretty sharp boost, but consideration must be given the fact fender dies represent costwise almost 90 per cent labor and hence could be expected to show cost increase somewhat out of line with other production tools or with actual parts going into the car. Nevertheless it is at once apparent the cost of a finished automobile cannot help being appreciably higher, even if you scale down the 80 per cent increase in fender die costs and apply lower percentages to other tools and parts. A 15-20 per cent increase in overall costs does not appear unreasonable.

Die work now in process appears to be pretty largely for the General Motors divisions. Little, if any, Chrysler die work has appeared in the plants of outside suppliers of these items. Ford die jobs are handled for the most part in Ford's own die shop, and a recent visitor there saw little evidence of any automotive work in process. From present indications, GM may be somewhat ahead of the parade on new model preparations, and thus may find itself in a more advantageous position once the coming scramble for automotive material starts. Observers around Detroit are convinced it is going to be a wild scramble, whether under WPB controls or not.

Chrysler divisions have been proceeding slowly on preparations for automobiles. In contrast to General Motors, few orders have been placed with suppliers covering parts and materials for initial production requirements. This reticence is believed to stem largely from the insistence of President K. T. Keller on sticking to war production and forgetting about any preparations for eventual automotive reconversion. Mr. Keller is a director of the Army Ordnance Association and a leading spokesman for the effectiveness of industry-ordnance "teams," both in war and in the peace to come. This is natural in view of the major part which Chrysler is playing in production of ordnance items, principally tanks, trucks and guns.

Speaking recently before the Aberdeen, Md., post of the association, Mr. Keller pointed to the "miserably small" expenditures for research and development to which the ordnance department was restricted, even after it was apparent this country would become embroiled in the second world war, and urged that "we begin now to make sure that the pattern of co-operation between industry and ordnance is kept alive after the war is won—that the necessity and desirability of keeping it alive are kept before the country and before the Congress so that in returning to peacetime pursuits it will be neither forgotten nor abandoned, but developed as a continuing bulwark of our national security."

He further observed: "Maybe this will be the war to end wars. I sincerely hope so both as a private citizen and as an automobile manufacturer. Wars do business no good. Industry's prosperity is peacetime activity. So I am neither an internationalist nor an isolationist. I am neither a pacifist nor a warmonger. I am an American.

"But world security, which means our own security, cannot be based on the number of weapons we may have left over from this war. It will be based on the supremacy of the weapons of the future. And such weapons should be American weapons, the product of American industrial and military science."

Long-awaited decision of the National Labor Relations Board in the foremen's case constituted a major reversal of earlier policy but was the expected result of CIO pressure. Ruling in the case of foremen at the Packard plant here, the board reversed its decision in the Maryland Drydock case of 1943 and decided foremen are not a part of management and thus are free to organize for collective bargaining. The vote was 2 to 1, with the majority stating foremen in industry today are merely "traffic cops — required to adhere to fixed

BEATS SCHEDULE: Less than a month after receiving an emergency order for 200,000 of a new type of 4.5-inch rocket fin that required a complete new tooling job, the Pontiac plant of the Fisher Body Division, General Motors began shipping completed fins for overseas battle zones, ahead of schedule. Here women workers are checking and touching up bomb fins preparatory to crating for shipment

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patterns and procedures," with no authority to make decisions or act on discharge, transfer or reclassification of employes under them.

As a result, the 1100 foremen at Packard shortly will vote whether or not they wish to be represented by the Foremen's Association of America—and the vote will be about 10 to 1 in favor—after which negotiations for contract doubtless will be undertaken with the company management.

Despite the fact Ford Motor Co. foremen have been working under a union contract with the management for some time, other managements view this decision as severing the last tie they have had with workmen in their plants, even though this tie has been worn down to threadlike proportions.

Supported By UAW-CIO

The UAW-CIO has consistently denied it is supporting the organization of foremen, but the actions of union members during the foremen's strike last spring label this demand for the double talking it is. During this strike, foremen who attempted to keep on the job were booed continuously by union workers, their orders were ignored, they were cursed, production dropped 50-60 per cent. Attempts by superintendents to fill the breach were resisted. These same conditions were noted in five other plants where foremen were striking.

Here is a verbatim report from one of these plants: Employes in one department stopped work as a protest to foremen who continued to work. Committeemen were unable to persuade employes to resume work. Later a plant representative and an army officer visited this department where employes stood around one foreman in a menacing manner, booing. Several shouted, "Let's throw him out." The plant representative advised the foreman to go to the front office. Some 50 or 75 employes followed him. The same tactics were used in the case of other foremen, with 200-250 employes surrounding them and calling names, some throwing rivets, etc.

The UAW-CIO was unqualifiedly supporting the foremen's strike, and it would not surprise many to find the UAW taking over control bodily of the Foremen s Association of America. The next step would be to organize superintendents and their assistants. Engineers, draftsmen and office clerical help already have been organized in several plants. Give them time and they may even organize presidents, vice presidents and boards of directors; at stockholders the line probably would be drawn.

Employment trends at Chrysler plants during war years make interesting observation and throw light on some of today's conditions:

	Total	Negro Male	Negro Female	Total Women
Peacetime				
Peak ...	82,249	1,978	.....	6,160
Present ..	120,000	12,988	5,160	35,223

In peacetime, all negro help was employed either in the foundry or in maintenance work; many now are doing a variety of production and assembly jobs.

Percentage of colored help in Detroit area foundries is at an all-time record high, ranging from 75 to 85 per cent. Some of these workers are making as high as $2 an hour straight time, and the problem of postwar downgrading of negro help—and of all help, for that matter—is a tough one to contemplate.

Preliminary report on Packard operations for 1944 discloses a 34 per cent increase in dollar volume of business, totaling $455,692,753. This is considered by company officials to be the wartime peak year, and present outlook for 1945 envisions a volume of around $350,000,000, although this could be radically influenced by momentary war developments. Nevertheless, at the end of 1944, Packard had unfilled orders on the books totaling $700,000,000.

A Ford plant at Ypsilanti, Mich., has been in production since the first of the year on a new type of aircraft generator, known as the R-1, succeeding the P-1 of which Ford manufactured better than 76,000. The new model supplies 300 amperes current at 30 volts with maximum speed of 8000 r.p.m. It is used in both combat planes and bombers. Initial order was for 10,000, but additional quantities have been ordered, necessitating a 60 per cent increase in output.

Under a consent decree signed in Federal Court here last week, Henry J. Kaiser succeeded in restraining engineer Karl K. Probst, whom he formerly employed, from assigning any rights to designs or inventions in connection with a midget jeep and small car which Mr. Probst put together while under contract with Kaiser. The engineer is also enjoined from revealing any information regarding these "military secrets."

Vehicle Not Revolutionary

This writer has inspected two of the models which Probst developed and while they embody a number of innovations in construction, they were nothing revolutionary, and the guess is hazarded they will continue to be "military secrets," even after the war is ended. Mr. Probst is now employed by Reo at Lansing, Mich., according to reports.

Detroit Edison Co. is sponsoring a demonstration of induction and dielectric heating at its Edison Heating Plant here, April 10-12. Allis-Chalmers, Budd Wheel, Federal Telephone & Radio, General Electric Induction Heating, Lepel Laboratories, Ohio Crankshaft, Girdler Corp., and Westinghouse Electric will co-operate in the three-day exhibit—admission by tickets obtainable from Detroit Edison Power Sales Department.

An automobile establishment, which apparently will be an assembly plant in the first period of operation, is to be started in India under guidance of British technicians, according to reports reaching the U. S. Department of Commerce.

The establishment is to start operations with articles of British manufacture, such as engines, axles, bodies, chassis and similar parts.

Operations will be conducted by local labor under guidance of a selected group of skilled technicians.

New and used spare parts for gas and diesel marine engines, worth about $100,000, have been declared surplus by owning agencies and are now on sale, the United States Maritime Commission has announced. Information may be obtained from the Materials Disposal Section, Contract Settlement and Surplus Materials Division, U. S. Maritime Commission, Washington 25.

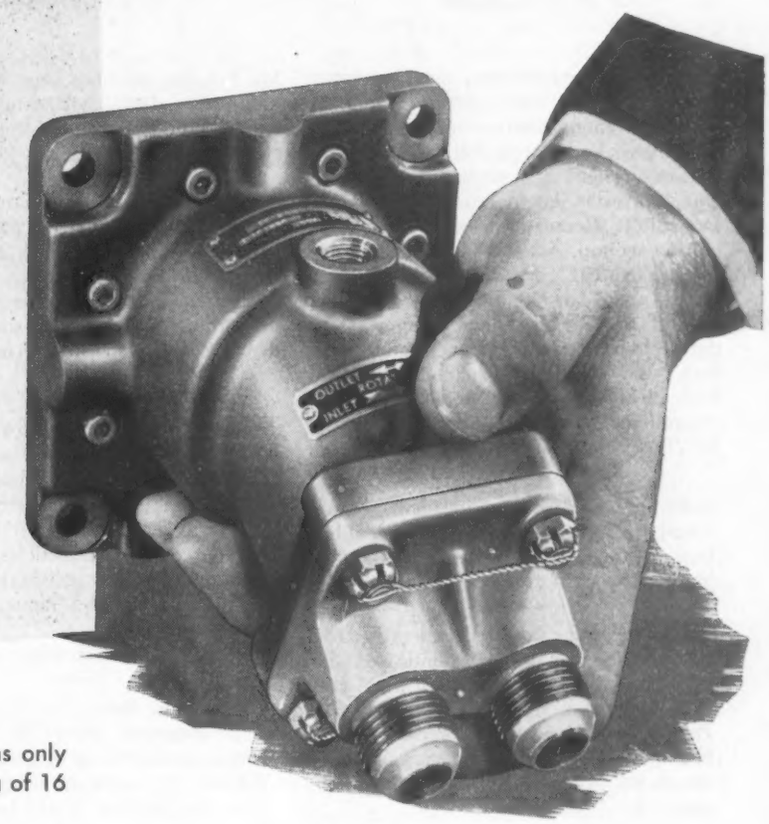
BACKING UP THE FRONT: Weapons, ammunition, food and other supplies follow the American armies into Germany, crossing the Rhine on pontoon bridges built in the United States and erected by U. S. Army Engineers. NEA photo

2.5 HORSEPOWER PER POUND

IS THE OUTPUT OF THIS

VICKERS AIRCRAFT HYDRAULIC MOTOR

PISTON TYPE CONSTANT DISPLACEMENT



This Vickers Aircraft Hydraulic Motor weighs only 6.4 pounds yet it has a normal output rating of 16 horsepower at 3000 psi and 3750 rpm.

But a high horsepower/weight ratio is not the only advantage of using Vickers Hydraulic Motors for delivering rotary mechanical motion on many aircraft applications. These hydraulic motors save space as well as weight. Starting and stalled torque can be higher than operating torque if desired. They can be stopped accurately to position . . . no clutches or brakes are required. They are used for dynamic braking and can be stalled for long periods without damage. These hydraulic motors can be started and stopped at high acceleration and deceleration rates due to the very low inertia of the moving parts. They cause no radio interference. Reversal and accurate control of speed are very simply and easily accomplished.

Whether designed primarily for aircraft work or for flexible power transmission and control in industrial installations, Vickers Piston Type Hydraulic Motors are inherently simple and rugged, with resulting minimum maintenance; they are easy to install and widely adaptable. All of these characteristics suggest many applications to a wide variety of new postwar equipment.

VICKERS *Incorporated* · **1480 OAKMAN BLVD.** · **DETROIT 32, MICHIGAN**

Engineers and Builders of Oil Hydraulic Equipment Since 1921

MEN of INDUSTRY

O. B. J. FRASER

G. D. THOMPSON

G. V. LUERSSEN

Heading the following newly created sections of the Development and Research Division, International Nickel Co. Inc., New York, are: **O. B. J. Fraser,** industrial chemicals section; **F. L. LaQue,** corrosion engineering section; and **Donald J. Reese,** iron and nonferrous casting section. Associated with the company since 1917, Mr. Fraser is treasurer of the American Welding Society, chairman of the Nickel Alloys Committee of the Welding Research Council, and chairman, sub-committee on refined nickel and high nickel alloys, cast and wrought, of committee B-2, of the American Society for Testing Materials.

—o—

Kenneth T. Norris, president, Norris Stamping & Mfg. Co., Los Angeles, has been elected chairman of the Western States Council's steel committee.

—o—

R. D. Parsons has returned to his former position as sales representative, Chicago district office, ACF-Brill Motors Co. Since the outbreak of the war, Mr. Parsons has been at the company's plant in Philadelphia performing various duties associated with the production of war materiel.

—o—

F. S. Cockburn has been re-appointed field representative in Peru for Allis-Chalmers Mfg. Co., Milwaukee, which post he held prior to the outbreak of the war. Working in conjunction with the company's distributors for Peru, Peruvian Trading Corp., Ltd., S. A., he will be located at Casilla 2233, Lima, Peru, S. A.

—o—

Henry F. Harrison has been appointed master mechanic, Michigan Tool Co., Detroit.

—o—

Ray G. Reynolds has been appointed assistant advertising manager, Continental Steel Corp., Kokomo, Ind.

—o—

Ward R. Schafer has been elected vice president, Edison General Electric Appliance Co., Chicago, in charge of sales. Mr. Schafer, who has been with the company since 1923, will continue to have his headquarters at the company's Chicago offices.

—o—

G. D. Thompson, chairman of the board of directors of Pittsburgh Steel Foundry Corp., Glassport, Pa., has been elected president, effective immediately. A member of the company's board of directors for the past six years, Mr. Thompson became chairman in 1942.

—o—

Tracy C. Jarrett, chief metallurgist, Koppers Co. Inc., American Hammered Piston Ring Division, Baltimore, has been appointed to the technical committee, Gray Iron Founders' Society, Cleveland. Dr. Jarrett, author and co-author of a number of technical articles and inventor of a metallurgical polishing and lapping machine bearing his name, was formerly assistant chief metallurgist, American Optical Co., Southbridge, Mass.

—o—

Robert E. Briggs has been appointed shop engineer, **Ivan B. Wagner Jr.,** senior assistant shop enginere and **Henry Wagner Jr.,** assistant shop engineer of Lima Locomotive Works Inc., Lima, O.

—o—

William C. Dunn, president, Ohio Crankshaft Co., Cleveland, has been elected a director, Ohio Seamless Tube Co., Shelby, O., to fill the vacancy caused by the recent death of Walter W. Van Horn. **E. W. McNeill,** secretary and treasurer; **Aaron Waines Jr.,** manager of sales, and **Clayton Mayer,** works manager, were elected vice presidents in addition to their present positions with the company.

—o—

H. S. Pahren has been appointed plant manager, Ridgway Division, Elliott Co., Jeannette, Pa., and R. E. Millan has been appointed sales manager of the division.

—o—

Frank J. Karg has been named president, Herman Machine & Tool Co., Tallmadge, O., to succeed Leo Herman who becomes chairman of the board. **A. G. Bachman,** in addition to continuing as secretary, will assume the treasurer's post.

—o—

G. V. Luerssen of Carpenter Steel Co., Reading, Pa., was awarded the Stoughton plaque for outstanding achievement in metallurgical research at the annual meeting of the Lehigh Valley section of American Society of Metals. Mr. Luerssen, who is author of numerous technical papers, was presented the plaque for having devised a special means of testing tool steels.

—o—

S. M. Luce has been appointed manager of a new branch and warehouse in Dallas, Tex., of the Fire Extinguisher Division, General Detroit Corp., Detroit.

—o—

Major Charles M. Beeghly will return to his post as sales manager, Cold Metal Products Co., Youngstown, O., May 1. For the past two and one-half years, Major Beeghly has served in the Air Corps.

—o—

Alexander C. Brown, vice president, Cleveland-Cliffs Iron Co., Cleveland, has been elected a member of the executive committee of the Lake Carriers' Association.

—o—

E. J. Flood has been appointed general district sales manager for the Chicago sales territories of American Chain & Cable Co. Inc., Bridgeport, Conn. Mr. Flood has been with the company for 25 years in the Page Steel & Wire and American Chain Divisions, and will continue his headquarters at 400 West Madison street, Chicago.

—o—

J. J. Duffy Jr. has been made assistant manager of sales, Pennsylvania Salt Mfg. Co., Philadelphia.

—o—

W. H. Moriarty, assistant to the president, National Malleable & Steel Castings Co., Cleveland, has been assigned

FRANK R. WRIGHT

ALFRED B. EGAN

the additional duties of assisting in the administration of the railway sales department of the company.

—o—

Frank R. Wright has been appointed New England district manager, Rustless Iron & Steel Corp., Baltimore. Mr. Wright who had been district manager of the company's Buffalo office, will have his headquarters at the company's new Boston sales office, 201 Devonshire street.

—o—

Paul D. Berry has been elected an assistant treasurer, American Rolling Mill Co., Middletown, O. Mr. Berry, who has been credit manager since 1936, will continue also in that capacity.

—o—

Raymond P. Lansing has been elected a director of Bendix Aviation Corp., Detroit. He is a vice president and group executive of the corporation, and a member of its administration and engineering policy committees.

—o—

W. W. Wilson, general manager, Roth Mfg. Co., Chicago, has been elected vice president. He joined the company in 1914 as assistant to the president, was made general superintendent in 1930 when the organization was purchased by Vapor Car Heating Co. Inc., and advanced to general manager five years ago.

—o—

Arthur R. Shevlin has been appointed New England sales and service representative for Eclipse Counterbore Co., Detroit, with headquarters at 238 Park Square building, Boston.

—o—

E. Clair Book has been appointed assistant purchasing agent, Lukens Steel Co., Coatesville, Pa., including its divisions, By-Products Steel Corp., and Lukenweld Inc.

—o—

Edward W. Hill has been appointed vice president, La Consolidada, S. A., to be in charge of the company's plants at Mexico City and Piedras Negras, Mexico. Mr. Hill had been with Carnegie-Illinois Steel Corp., Pittsburgh, prior to his joining the company two years ago.

—o—

Alfred B. Egan has been appointed district manager, Chicago district, Sheffield Steel Corp., Kansas City, Mo. Mr. Egan, who has been with the company for 16 years, has been in charge of the Sheffield Washington office since 1942.

—o—

Marcel C. Boss has been made chief engineer in charge of design and production operations, Optimus Equipment Co., Matawan, N. J.

—o—

J. Owing of Youngstown Sheet & Tube Co., Youngstown, O., has returned to the Pipe Branch of WPB's Steel Division.

—o—

Ward Keener has been appointed assistant to the president, B. F. Goodrich Co., Akron, O.

—o—

Herbert Willetts has been elected assistant general manager of eastern marketing, Socony-Vacuum Oil Co. Inc., New York.

—o—

R. W. Higgins has been elected comptroller, Pullman-Standard Car Mfg. Co., Chicago, and G. C. Thiele has been elected assistant comptroller.

—o—

James F. McIntire has been elected president, U. S. Radiator Corp., Detroit, and **L. Gillespie Erskine** has been elected chairman of the board.

—o—

C. M. Bovard has been advanced to the position of design engineer and **Ralph H. Schlosser** to chief draftsman for the Cooper-Bessemer Corp., Mt. Vernon, O.

—o—

Gordon Gage has been appointed manager of the Butler, Pa. Division of American Rolling Mill Co. succeeding **Harry Holiday,** resigned. Mr. Gage has been general superintendent. **Roy P. Tooke,** assistant chief of the company's general engineering department in Middletown, O., succeeds Mr. Gage as general superintendent at Butler.

—o—

Hugh M. Beshers has been appointed director, Farm Machinery and Equipment Division, War Production Board.

—o—

E. C. Murdock, who has handled sales and service for Yoder Co., Cleveland, in the Michigan area, has been made manager of the company's new Detroit offices in the Maccabees building.

—o—

L. S. Panek of Lansing, Mich., has been appointed assistant director of WPB's Aircraft Division, and **Jean A. Dubuque** of Richmond, Va., has been made chief of the division's aircraft production branch. Mr. Panek, who will serve with **Morton H. Wilner,** deputy director of the division, joined WPB three years ago.

—o—

W. K. McLellan, formerly associated with Budd Wheel Co., Detroit, has become assistant to **C. H. R. MacKenzie,** Luria Steel & Trading Corp., Detroit.

—o—

Bernard Gould, formerly in charge of dip tank sales, has been appointed general sales and advertising manager, Aeroil Burner Co. Inc., West New York, N. J.

—o—

Walter Tydon has been promoted from assistant chief engineer to chief engineer of the Buffalo plant of Curtiss-Wright Corp. Airplane Division. **John M. Martin,** assistant to the general manager of the Kenmore plant, has been named manager of the division's subcontracting activities, succeeding **W. R. Baldwin,** who resigned because of ill health. **L. W. Botts** has been appointed assistant to the Kenmore plant's general manager.

—o—

Paul Renshaw, president, General Railway Signal Co., Rochester, N. Y., **Hobart C. Ramsey,** executive vice president, Worthington Pump & Machinery Corp., Holyoke, Mass., and **James C. Willson,** director of Curtiss-Wright Corp., New York, have been nominated to fill vacancies on the directorate of Symington Gould Corp., Rochester.

—o—

H. Lawrence Mills has assumed charge of electrical engineering department, Melco Products, Minneapolis, and **Harold C. Mithun,** formerly sales engineer for Westinghouse X-ray, has become head of the company's mechanical engineering department. Mr. Mills and Mr. Mithun are co-partners and sole owners of the company.

—o—

J. M. Miroff has been appointed president, Royal Metal Mfg. Co., Chicago, to fill the vacancy created by the retirement of **C. E. Gaul.** Formerly vice

president and general manager, Mr. Miroff is succeeded by **Irving Grombacher.**

—o—

R. J. Morfa has been elected to the board of Cleveland Cliffs Iron Co., Cleveland.

—o—

Milton Strauss has been elected president and treasurer of the Boss Bolt & Nut Co., Chicago, a division of the Lock Nut Corp. of America. Other officers are: **C. J. Johnson,** re-elected secretary and named assistant treasurer; **George S. Hubbard,** vice president and sales manager. **Edward J. Guck** has been appointed general manager, in charge of production.

—o—

Frederick von Raab has become export manager, Carpenter Steel Co., Reading, Pa.

—o—

John Heronymus has been elected president and **William H. Pauly** has been elected chairman of the board, American Hydraulic Inc., Fond du Lac, Wis. Other officers elected were: **Felix T. Pauly,** executive vice president; **Chester H. Schmidt,** vice president; **Lon L. Grier,** secretary; **William H. Schmidt,** treasurer and general manager; and **Kryn C. Hamelink** was named comptroller.

GORDON N. GRAY

Who has been appointed works manager, St. Clair plant, Bryant Heater Co., Cleveland, as noted in STEEL, March 26, p. 80

—o—

G. W. Vaughan celebrated his tenth anniversary as president of Curtiss-Wright Corp. March 20.

—o—

C. P. Pesek has been made administrator of engineering, Minnesota Mining & Mfg. Co., St. Paul, and W. A. Thomas, assistant chief engineer, has become engineering consultant on Mr. Pesek's staff.

—o—

Barnard S. Meade has been appointed vice president, American Swiss File & Tool Co., Elizabeth, N. J., succeeding Philip Schaeffer who has resigned.

—o—

W. R. Gilmore has been elected chairman of the board of the Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Other officers elected are: **R. L. Gilmore,** president and general manager; **F. H. Johnston,** vice president and treasurer; **Howard Goodman,** secretary.

OBITUARIES . . .

Vincent Bendix, president, Bendix Helicopters Inc., died March 27 in New York. He was founder of Bendix Aviation Corp., South Bend, Ind., and widely known for his inventions.

—o—

Dr. Nevil Monroe Hopkins, 71, inventor and engineer, died March 26 in New York. He was consulting engineer for various companies, including Union Carbide & Carbon Co., New York. He was also in charge of the Union Carbide & Carbon Research Laboratories. His inventions included various types of ordnance and at the time of his death he was working on plans for new types of submarines, destroyers, rockets and rocket guns for the Navy.

—o—

James H. McKee, executive engineer of the Curtiss-Wright Corp.'s Propeller Division, and pioneer in the development of the hollow steel airplane propeller blade, died March 25 at Essex Falls, N. J. He was 56.

—o—

Samuel R. Lincoln, 44, superintendent of plant No. 1, Fisher Body Division, General Motors Corp., Cleveland, died in that city March 26.

—o—

Charles A. Boughner, 49, safety director, sheet and tin plate mills, Carnegie-Illinois Steel Corp., Gary, Ind., died recently.

—o—

Thomas H. Cleveland, 49, for the past eight years assistant credit manager, Inland Steel Co., Chicago, died in that city March 22. Before coming to Inland, Mr. Cleveland had been with Jones & Laughlin Steel Corp., Pittsburgh, for 20 years.

Alfred F. Jackson, 39, president, Aeronautical Products Inc., Detroit, was killed in an airplane crash en route to the company's Washington Court House, O., plant, March 20.

—o—

James Dickson, secretary and treasurer, Anaconda Copper Mining Co., New York, died March 20 at Garden City, N. Y. He was associated with the company for 32 years.

—o—

Alexander Turner, 78, former vice president, National Bearing Metals Corp., St. Louis, and a director of Vapor Car Heating Co., Chicago, died March 20 at Englewood, N. J.

—o—

Walter C. Elze, general manager, Hauck Mfg. Co., Brooklyn, N. Y., died recently at Jamaica, N. Y.

—o—

John Rhoades Dennis, 67, president and treasurer, H. M. Howe Co., Providence, R. I., died in that city March 24.

—o—

Harold Kingsmill, 71, former president, Cerro de Pasco Copper Corp., died March 25 in Greenwich, Conn. Mr. Kingsmill who resigned as president last September remained as a director and consulting engineer for the corporation until his death.

—o—

Joseph F. Huebsch Sr., president of the Huebsch Mfg. Co., Milwaukee, died March 26 in that city after a long illness. He was 76, and was well known as the inventor of commercial laundry machinery.

—o—

Henry Brewer, who retired in 1930 as vice president of the Winchester Repeating Arms Co., Bridgeport, Conn., died March 21 at his home in Ishpeming, Mich. He was 72. During World War I, he was in charge of shell production for the Winchester company. In 1900 he headed a mission to China for his firm.

—o—

Joseph F. Shepherd, manager, service engineering department, Sheffield Corp., Dayton, O., died there recently. Mr. Shepherd had been with the company for 22 years.

—o—

Leslie M. Hansen, 55, president, Industrial Silica Corp., Chicago, died recently in Barrington, Ill. Mr. Hansen was president of the National Industrial Sand Association in 1941.

—o—

Walter E. Marble, 86, salesman, D. A. Stuart Oil Co., Chicago, died recently in that city. He has been associated with the company 54 years and had been engaged in selling lubricating oil and cutting fluids to the metalworking industry nearly 65 years.

—o—

George F. Pond, 58, vice president and western sales manager, Pneumatic Scale Corp., Ltd., North Quincy, Mass., died recently. Mr. Pond made his headquarters in Chicago.

—o—

William J. Magavern, 79, secretary, Strong Steel Foundry Co., Buffalo, died March 26.

—o—

Donald N. Mussen, 46, head of sales and research engineering at Trico Products Corp., Buffalo, died March 21 in that city.

—o—

John P. Maison, 65, chief inspector at American Radiator & Standard Sanitary Corp., Buffalo, died March 21 in that city.

Western Roads Prepare To Handle Increased Pacific War Traffic

Old equipment rehabilitated, new equipment purchased. Strategic areas double-tracked, new bridges built, freight yards enlarged. Centralized traffic control systems installed on nearly 1400 miles of track by four major roads

AS the European war goes into its closing phases transcontinental railroads serving the West Coast are putting final touches to preparations for transporting supplies to the Pacific war front.

It will be the biggest assignment they have ever tackled and it probably will continue for months at a steadily rising pace. How big a job they face is indicated in unofficial estimates that traffic will increase at least 25 per cent over the previous peak movement, in October, 1943.

Getting ready for this climax has been going on for more than three years. Now the railroads think they can carry all the freight which the military will be able to handle at West Coast embarkation ports.

The preparations have been costly. Millions of dollars have been spent by the roads for new equipment and double tracking in strategic spots; for new bridges; for expansion of freight yards and spur tracks; and for scores of other improvements.

One of the most valuable of these has been installation of centralized traffic control systems on nearly 1400 miles of track of four major railroads serving the Pacific Coast. This system often makes one track do the work of two and increases the capacity of a single track by 50 to 75 per cent on an average. It costs about $10,000 a mile to install, but this is only a fraction of the cost and extra effort and time involved in installing double tracks.

Bottlenecks Prevented

Traffic control is placed at carefully surveyed stretches of track which could become bottlenecks when heavy traffic is involved. Briefly, it operates like this: Each mile of CTC track is connected by wires to a central station where all movements of trains are controlled by a dispatcher who traces the flow of traffic on a lighted central panel board. Position of each train is shown constantly on the board. When trains approach each other from opposite directions, the dispatcher by means of block signals slows or speeds their movements and runs one on to a passing track a few minutes before they meet. Frequently the trains pass without slackening speed, all on a single mainline track. The system also eliminates the need for written dispatches to train crews, as all movements are directed and handled automatically by block signals and switches. CTC has ended long delays on sidings, and mainline traffic no longer is jammed by slow moving trains.

Heavy diesel locomotives will do much to help carry the war load on the western lines, and the overall fleet of this type of motive power steadily is being increased. Greatest user of diesels is the Santa Fe which at the end of 1944 had 199, and it has more on order. They were operated over five million miles last year.

Diesels are most valuable because of the contour of the country which must be traveled on the long haul from eastern and midwestern industrial centers to the Coast ports. These locomotives have their greatest pulling power at slow speeds, and the big 5400 horsepower units can pull 70-car freight trains over the steepest grades without helper engines.

The western railroads will not know until they are well into the war load whether or not they will have enough rolling stock. They have been increasing their supply of cars, and they count on diversion of equipment from other railroads once the flow of traffic shifts from the Atlantic to the Pacific. Another factor which will help speed traffic is the increased efficiency in loading and unloading cars. The Army has co-operated exceptionally well in this program, and currently is releasing 90 per cent of the cars on the Coast within 48 hours.

All of the major roads in the West, the Santa Fe, Southern Pacific, Union Pacific, Western Pacific, the Great Northern and the Northern Pacific, have added trackage in terminals, increased switching capacity, and expanded yard locations. Heavier rails have been laid on busy traffic lines, tunnels have been enlarged and widened, and wooden trestles have been replaced in many instances with steel spans. Southern Pacific and Santa Fe have completed big new double-track bridges at important points.

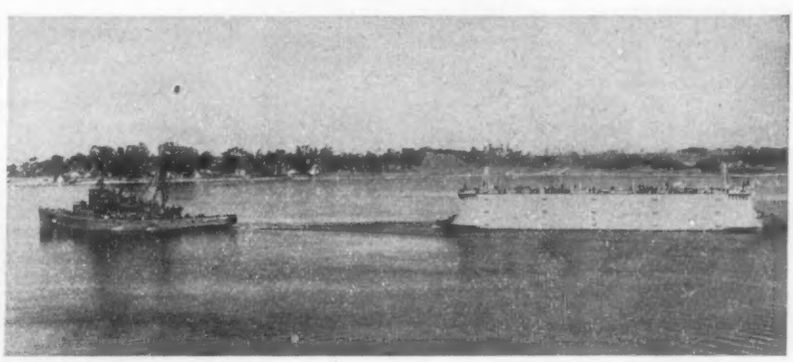
The manpower situation, which has been one of the war's biggest troubles for the railroads, gradually is easing. Skilled workers, such as machinists and shop mechanics, still are needed, but common, unskilled labor is more plentiful. As shipyard work falls off during the coming months, roads on the West Coast are expected to have all ordinary manual labor they need.

Expansion of embarkation facilities has been going forward and wharfage space and docks at San Francisco have been increased substantially to handle the big Pacific load. At Long Beach, Southern California's harbor, port facilities by the end of the year will be 150 per cent over prewar capacity and the port will be able to handle 450,000 tons a month.

Says Many Eastern Firms To Operate Branches on Coast

Scores of eastern companies engaged in manufacture or fabricating of steel and other metals are planning or have already selected sites for branch plants in Los Angeles, W. H. Eisenman, secretary, American Society For Metals, said last week.

Mr. Eisenman, on a western speaking tour and inspection trip in conjunction with conferences with various chapters of the society, found Southern California industry as diversified as in any other industrial area.



FLOATING DRY DOCK: Mobility of the repair equipment being built for the Navy is illustrated by this floating steel dry dock being towed away from the Chicago Bridge & Iron Co.'s yard at Eureka, Calif., where it was built. Official U. S. Navy photo

WING TIPS

British and American aircraft engine designers attempt to coordinate blueprints to speed production. English drafting prints omit details required by American designers for mass output

PRODUCTION in the United States and Great Britain of aircraft engines and other equipment designed on either side of the Atlantic will be speeded up as the result of discussions now progressing in American factories and drafting rooms between a British mission of experts and American designers under the auspices of the Combined Production and Resources Board.

These experts are taking this action to enable shop machinists in both countries to understand each other's drawings and conventional designs. Although the common language of the engineer in all countries is the drawing, there are marked differences in design and drafting practice, CPRB said.

Such differences are among factors that have caused a gap of ten months between the arrival in the United States of technical drawings for the vital Rolls Royce Merlin engine and the actual beginning of production.

At a recent meeting in Washington of engineers and officials of the two governments, William L. Batt, American deputy member of CPRB, stated, in relating incidents connected with the production of the English-designed engine in this country: "American engineers found that considerable information usually shown on American drawings was not shown on the British drawings. Thus, complete shop notes had to be placed on each drawing and not until the final approved American drawing of the part was completed was it possible to design the parts, dies, jigs, or fixtures required for manufacturing.

Mr. Batt said that the problem was not so much one of redrawing the English blueprints as one of translating the radically different method of depicting what the designer wanted into American terms. Without this the American shop machinists would have found it virtually impossible to fabricate the parts as intended by the British designer.

It has been found that in many British drafting prints, of which perhaps the Rolls Royce design is a typical illustration, many details that American engineers expected to find were omitted from drawings because in England great reliance is put on the craftsmanship of old employes. Moreover, a great deal of hand fitting is done. For United States' mass production, however, it is required that every dimension and tolerance be clearly stated on the drawing for the benefit of all who work on the project.

ATSC Offers Employment To Discharged Veterans

A program endeavoring to place every interested discharged veteran of the Army Air Forces in a job with the Air Technical Service Command has been announced by Lieut. Gen. William S. Knudsen, director.

Pointing out that the ATSC has more than 6000 types of jobs in 137 installations throughout the nation, Col. Ralph Nemo, chief of personnel and base services for the ATSC, said every effort will be made to employ discharged veterans as long as vacancies exist and in capacities which will use their skills and experience in a manner which will be beneficial to the veteran as well as the war effort.

The ATSC is the largest employer of civilian personnel of any Air Force or Command. More than 200,000 civilians are employed in the work of experimental engineering, procurement, inspection, supply and maintenance of all AAF aircraft and the 500,000 items of equipment used by the Air Forces.

Colonel Nemo explained that the discharged veterans are to be used to fill vacancies created by the draft and through normal turnover. The offering of jobs to veterans does not indicate an expansion in the command.

In certain instances, the veteran will be eligible for specialized training in engineering, mechanics, and inspection. The veterans will be entitled to the same privileges as any federal employe, and in addition, will hold the veterans preference rating of 10 points in any examination they may take.

Packard Plans Research In Jet Propulsion

Arthur Nutt, director of the aircraft engineering division of the Packard Motor Car Co., Toledo, O., has revealed the company is preparing to include research in gas turbines and jet propulsion engines in its advanced aircraft engine developmental program undertaken at the request of the Army Air Forces Air Technical Service Command.

Speaking before 2000 Toledo and Detroit industrialists and AAF officials at a dinner in his honor, the Packard official described for the first time scope of the company's development program to be carried out with augmented facilities nearing completion at its Toledo division and the Willow Run Army Air Base.

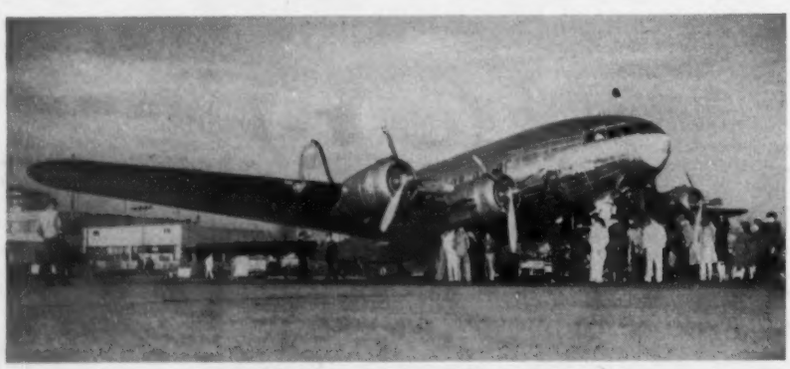
"We expect to do everything possible to keep ahead of the field in development of aircraft power plants," he said. "In this connection we are at the present time combing the market for men to work on gas turbines and jet propulsion engines."

Preheated Oil Saves Gas in Engine Tests

Results of a recent test indicate savings of high octane gasoline aggregating about 80 gallons per engine in the regular production testing of Pratt & Whitney aviation engines at the Chevrolet aviation engine plant, Tonawanda, N. Y.

Conservation of the fuel is effected by preheating the motor oil used in the engines during the test period. The heat exchanger in which the oil is preheated was designed and developed by Chevrolet engineers and built from parts of standard make. It consists of an arrangement of tubes within a cylinder container. Steam piped from the powerhouse surrounds the tubes, providing the heat. Oil circulates in the tubes until it has reached a temperature of between 161 and 167 degrees F. before it enters the engine for the first phase of the test.

In the first part of the test cold lubri-



CIVVY AGAIN: This Stratoliner, used by the Army Air Transport Command for the past several years, has been returned to TWA for commercial use. Above it is shown being serviced at the Chicago airport. NEA photo

PHILCO
gives you the latest in
Modern Battery
Design!
THOUSANDS of electric industrial trucks are now getting more work done at lower cost because of the advanced research of Philco engineers in developing tougher, more powerful storage batteries. Philco has long led in providing batteries of maximum capacity, with the rugged long-life construction especially engineered for today's heavier work schedules.
Now Philco engineering leadership is demonstrated anew with the storage battery that gives 30% longer life —the great new Philco "Thirty"! For lower cost in handling materials with electric trucks, be sure to include the new Philco "Thirty" in your plans. Now available in preferred types. Complete information gladly sent on request. PHILCO CORPORATION, *Storage Battery Division*, Trenton 7, New Jersey.
For 50 years a leader in Industrial Storage Battery Development
The new Philco "Thirty" with 30% longer life is identified by its distinctive red connectors.

cating oil was placed in a cold engine. It was necessary to run the engine for 65 minutes before the required heat at 2000 r.p.m. was reached. Under these conditions 45 gallons of high octane gasoline were used.

Next, the lubricating oil was preheated to 161 degrees before being introduced into the engine. Steam was left on during the entire warm-up period. It required only 7 minutes to reach the prescribed temperature, and only 5 gallons of gasoline were used. The 40-gallon saving must be multiplied by two since each engine goes through two testing operations known as the "green" and final tests.

Curtiss-Wright Builds 25,000 Planes for War

Airframes, engines or propellers for more than 100,000 aircraft for World War II have been delivered by Curtiss-Wright Corp.'s manufacturing divisions.

Curtiss-Wright's Airplane Division has delivered its 25,000th airplane built since Jan. 1, 1938. More than 20,000 of these aircraft have been turned out since Pearl Harbor.

During the same period, the corporation's other two manufacturing divisions, the Curtiss-Wright Propeller Division and Wright Aeronautical Corp. (aircraft engines), have provided propulsion for more than 75,000 aircraft. Over 90 per cent of these were combat or transport planes, many of them twin or four-engined.

A report issued recently pointed out that products of one or more of the three divisions figured in between 75 and 80 of the aircraft types which, in the hands of skilled pilots and crews of the Army, Navy and Marine air forces have helped win aerial supremacy over the axis in every combat theater.

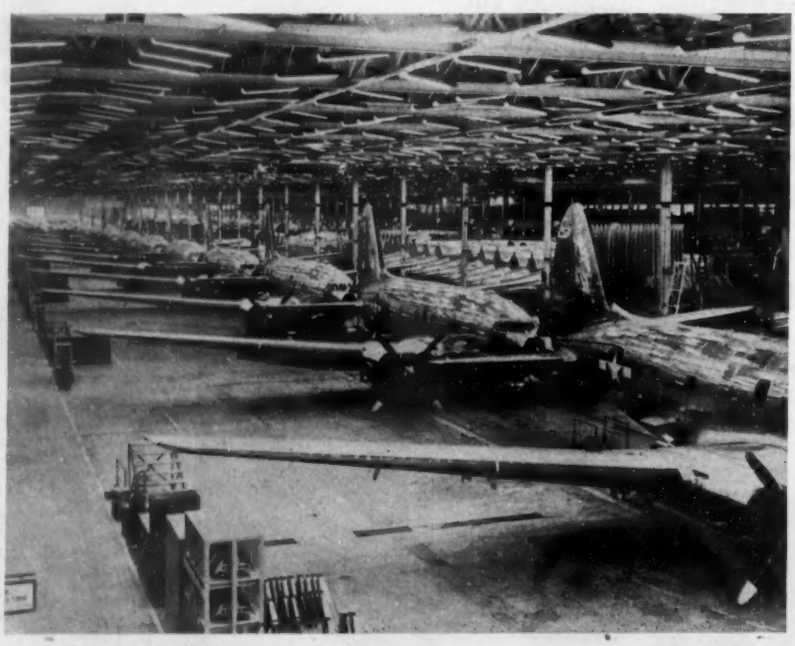
In the record total are such noted warplanes as the Curtiss Commando transport, Curtiss Helldiver divebomber and Curtiss P-40 Warhawk fighter; the Wright Cyclone powered Boeing B-29 Superfortress and B-17 Flying Fortress, North American Mitchell, Grumman Avenger, Lockheed Constellation and Martin Mars; famed Curtiss propelled fighters like the Lockheed Lightning, Republic Thunderbolt and Northrop P-61 Black Widow.

New Naval Vessel To Serve As Aviation Repair Shop

Revamping of the naval vessel LST into a beachhead aviation repair shop was disclosed with the launching of the first of a new-type Navy ARV—Auxiliary Repair Vessel (Aircraft) at United States Steel's American Bridge Co. shipyard, Ambridge, Pa.

Outwardly, the ARV is little-changed in appearance from the LST, but inside the ARV will be different. She will have an overhead crane that moves the length of the big compartment in which the LST carried her tanks. This main compartment will house drilling machines, lathes, and various other equipment for servicing aircraft. Hatches opening from the central room will connect with auxiliary shops which will be equipped with woodworking, sandblasting, electrical, and other devices. The ship will have an air-conditioned paint shop.

The new craft will provide an immediate repair base for aircraft on newly-captured beaches, and thus will help avert delays in building and equipping repair shops near new air landing strips.



COMMANDO TRANSPORTS: Curtiss-Wright's Airplane Division has produced more than 25,000 planes for World War II and has supplied propellers for more than 100,000 planes. Shown above is the final assembly line at the corporation's Louisville, Ky., plant where Curtiss C-46 Commando Transports are built

Water-Alcohol Device for Auto Engines Being Made

An automatic water-alcohol injection device, known as a vita-meter, for attachment to automotive engines has been placed in limited production by Thompson Products Inc., Cleveland. Aim is to make the device available for motorists by the end of the year, but thus far only a few hundred have been manufactured, for installation on truck fleets.

The injector was described before the Society of Automotive Engineers at its Detroit meeting in January and comprises five main parts: Body casting, cover casting, diaphragm assembly, springs and a float. It is mounted on a flange placed between the carburetor and the intake manifold. Water-alcohol mixture is stored in a separate tank, about one-tenth the size of the fuel tank, and is piped to the injector. Manifold vacuum actuates the diaphragm which in turn controls the metering pin and regulates the flow of the water-alcohol mixture to the manifold.

Alcohol injection devices are now standard equipment on many types of military aircraft engines, serving to give an appreciable increase in "burst" horsepower. As adapted to automobile engines, they are claimed to save fuel and add as much as 15 units of octane power to gasoline, thus permitting the use of lower-grade fuel without knocking.

Belgian Tool Dealers Wish To Renew Contacts in U. S.

Machine tool dealers in Belgium are anxious to renew contacts with American exporters and many are said to be interested in visiting the United States to study developments in the machine tool industry, according to the Department of Commerce.

Some factors in the Belgian machine tool trade believe that it will be necessary to replace 90 per cent of present equipment.

Machine tools used in Belgium before the war were, for the most part, light and low-speed machines of German origin. With the exception of lathes, it is reported few machines in Belgium are capable of attaining the high production possible with the new tool steels.

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Technical Service
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Local Meetings For Open-Hearth Groups Planned

National conference replaced this spring by local sessions upon requests of open-hearth steel producers

SUBSEQUENT to cancellation of the Twenty-eighth National Open-Hearth Conference and in compliance with the requests of many open-hearth steel producers, the executive committee of the National Open-Hearth Conference has authorized its local sections to sponsor and hold, if desired, local conferences on open-hearth steel during the spring of 1945, provided these are in accord with ODT regulations.

Local conferences thus far scheduled include Philadelphia, April 20; Chicago, April 27; St. Louis, May 4; and Pittsburgh, May 18. Technical program originally lined up for the National Conference will be covered as completely as practicable, and the transcript of the discussion at the local meetings, together with a number of specially prepared papers and written discussions, will be published as the 1945 Proceedings.

There are no restrictions on attendance at such meetings by those using only city or suburban transit facilities and for which no hotel sleeping accommodations are necessary; for all others there are definite restrictions to which local sections and the hotels concerned will adhere rigidly.

Detroit Drop Forging Die Group Joins NTDMA

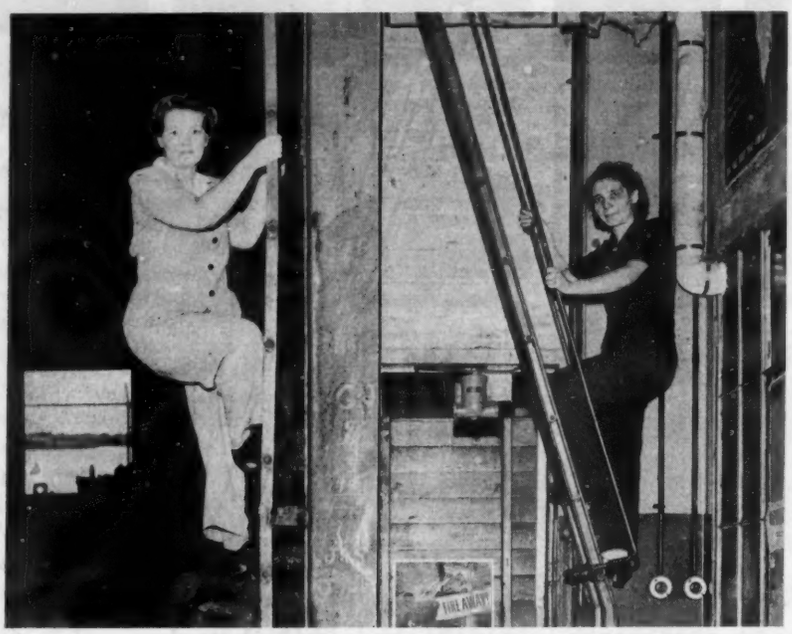
A group of drop forging die manufacturers voted at a meeting in Detroit recently to affiliate with the National Tool & Die Manufacturers Association, George S. Eaton, executive secretary, announced last week.

A Forging Die Section of NTDMA is planned to deal with any special activities of these manufacturers.

John S. Tincu, Tincu Forging Die & Tool Co., Chicago, arranged the Detroit meeting and was elected its chairman.

Manufacturers of Dairy Barn Equipment Organize

Organization of a Dairy Barn Equipment Association with a majority of the manufacturers producing essential barn equipment for dairy farmers as charter members has been effected. Its offices are in the Board of Trade building, Chicago.



SAFETY MEASURE: Vertical ladders, as seen at left, have been replaced by an improved type ladder with handrails, shown at right, to eliminate a safety hazard in the machine shop of the Bridgeport, Conn., forging plant of the Heppenstall Co. where women workers have replaced overhead crane operators who entered the armed services

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Walter Kidde & Co. Inc., Belleville, N. J., has purchased the capital stock of the Youngstown Miller Co. Inc., formerly of Sandusky, O., manufacturer of plastic coaters and oil reclaimers.

—o—

Monsanto Chemical Co., St. Louis, has started full scale production at its Duck River plant at Monsanto, Tenn., which the company operates for the government.

—o—

Cowles Detergent Co., Cleveland, has established an employes' profit sharing plan, the entire cost of which is paid by the company.

—o—

J. H. Keeney & Co., Chicago, manufacturer of radar equipment for the Army and Navy, will erect a building adjoining its present plant.

—o—

General Welding Co., Baltimore, has equipped a new department and plans additional expansion soon.

—o—

Victor Equipment Co., San Francisco, has issued an 84-page book presenting a comprehensive review of oxy-acetylene pipeline distributing systems.

—o—

Crosley Corp., Cincinnati, has arranged for Lindeteves Inc., New York, to be exclusive distributor for Crosley products in the Netherlands East Indies after that area is freed from Japanese control.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has announced a new electronic induction heater for brazing, soldering, annealing, hardening, and pre-forge heating applications.

—o—

Resistance Welder Manufacturers Association, Cleveland, has increased the scope of its prize contest for technical papers on resistance welding subjects, with awards now totaling $1000.

—o—

B. F. Goodrich Co., Akron, O., has put into operation the first tire factory in Oklahoma. It is located at Miami.

—o—

Cole Engineering & Mfg. Co., Cincinnati, has bought the Kruckemeyer foundry property at Blanchester, O., and will utilize facilities for a shell forging plant.

—o—

Aro Equipment Corp., Bryan, O., has appointed the following jobbers: Bernhardt-Seagle Co., Lenoir, N. C.; C. E. Hamlin Co., Jackson, Mich.; J. T. O'Connell Co., Providence, R. I.; Schaberg-

Dietrich Hardware Co., Lansing, Mich.; Cleveland Tool & Supply Co, Toledo, O; Lakeshore Machinery & Supply Co, Muskegon, Mich.; and Kendall Hardware-Mill Supply Co., Battle Creek, Mich.

—o—

Doehler-Jarvis Corp. will start constructing immediately for Defense Plant Corp. a $25 million war plant which Doehler-Jarvis will operate.

—o—

Bendix Aviation Corp., Detroit, has appointed the following to distribute its forthcoming line of radios and radiophonographs: Graybar Electric Co., San Francisco; General Utilities Distributors Inc., Milwaukee; Republic Distributing Co., Providence, R. I.; and D. K. Baxter Co., Sioux City, Iowa.

—o—

American Standards Association, New York, has approved a new American standard for sound level meters used for measuring intensities of noise and other sounds to evaluate their relative effect on the ear.

—o—

Jefferson Machine Tool Co., Cincinnati, has announced a new index table for dividing heads.

—o—

American Car & Foundry Co., New York, announced its Berwick, Pa., plant has been awarded the Stevenson safety trophy by its president, Frederick A. Stevenson.

—o—

Duraloy Co., Scottdale, Pa., has purchased the interest which the United States Pipe & Foundry Co., Burlington, N. J., owned in the Duraloy Co.

—o—

Lawrance Aeronautical Corp., New York, has taken between six and seven million dollars of new contracts for building critical parts for Grumman Aircraft Corp., Bethpage, N. Y.; Radio Corp. of America, New York; and Mergenthaler Co., Brooklyn, N. Y.

—o—

Indar Corp., Indianapolis, has announced a metallurgical service of supplying a complete line of all available metals for scientific, experimental, and production purposes.

—o—

American District Steam Co., North Tonawanda, N. Y., has issued a bulletin on heaters and coolers, including three new types.

—o—

Briggs Clarifier Co., Washington, has appointed LaGrave & Co., Mobile, Ala., as distributor for central and southern Mississippi, southern Alabama, and northwestern Florida.

—o—

American Foundry Equipment Co., Mishawaka, Ind., has issued an illustrated catalog describing its line of equipment.

—o—

East Coast Shipyards Inc. has discontinued operations at Constable Hook, a section of Bayonne, N. J., and has turned the yard over to the U. S. Maritime Commission.

—o—

American Ceramic Society Inc. will hold its annual meeting April 16 and 17 at Hotel Statler, Buffalo. The meeting is government-approved for past-presidents, officers, and committee chairmen.

—o—

Reeves Pulley Co., Columbus, Ind., announced that the new location of one of its representatives, W. G. Kerr Co., is 520 Oliver building, Pittsburgh.

—o—

Jack & Heintz Inc., Cleveland, is to buy a building there formerly occupied by the National Carbon Co. and use it for making equipment for the Army Air Forces.

—o—

Charles Dreifus & Co., Philadelphia, has moved its main offices from the Widener building to larger quarters in the Philadelphia Savings Fund Bank building, 12 South Twelfth street.

—o—

George Scherr Co. Inc., New York, has established a machine and precision exhibit at 200 Lafayette street, New York.

American Society of Tool Engineers Elects Officers

New officers have been elected by the American Society of Tool Engineers, Detroit.

They are: President, C. V. Briner, manager, Small Tool and Gage Division, Pipe Machinery Co., Cleveland; first vice president, A. M. Sargent, president and general manager, Pioneer Engineering & Mfg. Co., Detroit; second vice president, W. B. Peirce, vice president, Flannery Bolt Co., Bridgeville, Pa.; third vice president, Thomas P. Orchard, general manager, American Tool Engineering Co., New York; secretary, A. M. Schmit, general manager, A. M. Schmit Co., Toledo, O.; treasurer, W. J. Frederick, president, Frederick Steel Co., Cincinnati; and assistant secretary-treasurer, W. A. Dawson, Otis-Fensom Elevator Co. Ltd., Hamilton, Ont. Adrian L. Potter was reappointed executive secretary.

50th Anniversary Observed By Champion Rivet Co.

The Champion Rivet Co., Cleveland, is observing its fiftieth anniversary this month.

The company, of which Pierre Champion is president, is one of the largest manufacturers of large diameter rivets in this country and is a leading manufacturer of a complete line of mild steel welding electrodes.

Manufacture of steel and iron rivets was begun in April, 1895, and a line of welding electrodes was introduced in 1931.

Insurance Co.'s Manpower Used For War Work

Prudential Company makes all of its employes available for part-time war production, avoids cut in employe ceiling

AN interesting problem in manpower is being worked out in Newark, N. J., where there is a critical labor shortage. The War Manpower Commission recently advised the Prudential Insurance Co. of America, employing locally 8000 persons, that it would have to take a 10 per cent cut so that 800 of the company's workers could enter war plants. Prudential insisted that it would be impossible to continue its operations if such a reduction were to be made, and finally, as a compromise, suggested that essential war work be carried on in its building with its 8000 employes doing it in their spare time.

Various war plants indicated that certain phases of their work could be carried on by Prudential employes in their spare time—evenings, Saturdays, Sundays or whenever they could be relieved from their regular company work.

George S. Pfaus, WMC director in the Newark area, said that such an overall arrangement would be satisfactory so long as the total time worked at war production by all the Prudential employes totaled the equivalent of 800 working a full 48-hour week.

Three plants immediately accepted the Prudential offer, once it was approved by WMC, and already the company printing plant is engaged in Army and Navy lithographic printing. Soon, it is said, an assembly line for radio tubes will be installed in the Prudential building, and also a statistical analysis project for the Army Air Forces will be in operation.

No employe is to be released from the Prudential payroll. The war contractor, and not the Prudential company, is to pay the employe for the war work.

Mr. Pfaus said he believed this was the first time that any such plan had been undertaken by a nonessential company whose employe ceiling had been lowered.

Aircraft Industry Committee To Meet April 24

Aircraft Manufacturers Industry Advisory Committee will hold its first meeting April 24, with Henry P. Nelson, director of the Aircraft Division, War Production Board, as government presiding officer.

Centerless Th

Method is developed for applying centerless grinding principles in producing screw threads on hardened steel blanks at high speed. Half-inch screws ¼-inch in diameter threaded at rate of 85 per minute

PRINCIPLES of centerless grinding have been successfully adopted for producing accurately-formed screw threads on hardened steel set screw blanks in a single, automatic operation at high speed. The new machine is shown in Fig. 1.

M. A. Hollengreen, vice president and general manager, Landis Tool Co., Waynesboro, Pa., suggested this idea of grinding screw threads on a centerless grinding machine on Feb. 24, 1943. He also proposed forming the required grooves on the grinding wheel by means of crushing. This method requires a crusher in the shape of a cylinder with grooves of thread profile formed in its periphery. This crusher is rolled against the grinding wheel at low speed and with sufficient pressure to break down the bond of the grinding wheel grit, thus transferring the desired profile to the working surface of the wheel.

Following a year of development, Landis Tool Co. built an experimental centerless thread grinder. Early trials were made by grinding the threads on screws which were cut oversize. Later trials in grinding full threads "from the solid" demonstrated the real possibilities of this method. The blanks of set screws from a No. 4 size, (about ⅛-inch in diameter) 40-pitch to a ⅝-inch diameter, 11-pitch, have been ground in production from the solid hardened blank to a finished screw in a single pass through the machine. Twelve-inch long, ¼-inch diameter screws of 20-inch pitch have been ground with excellent results. Large rings, nearly 5 inches in diameter, having 16-pitch threads on their peripheries also have been ground. These and various other types of screw threads have been ground from solid stock, both in annealed and in hardened condition. Typical examples are shown in Fig. 3.

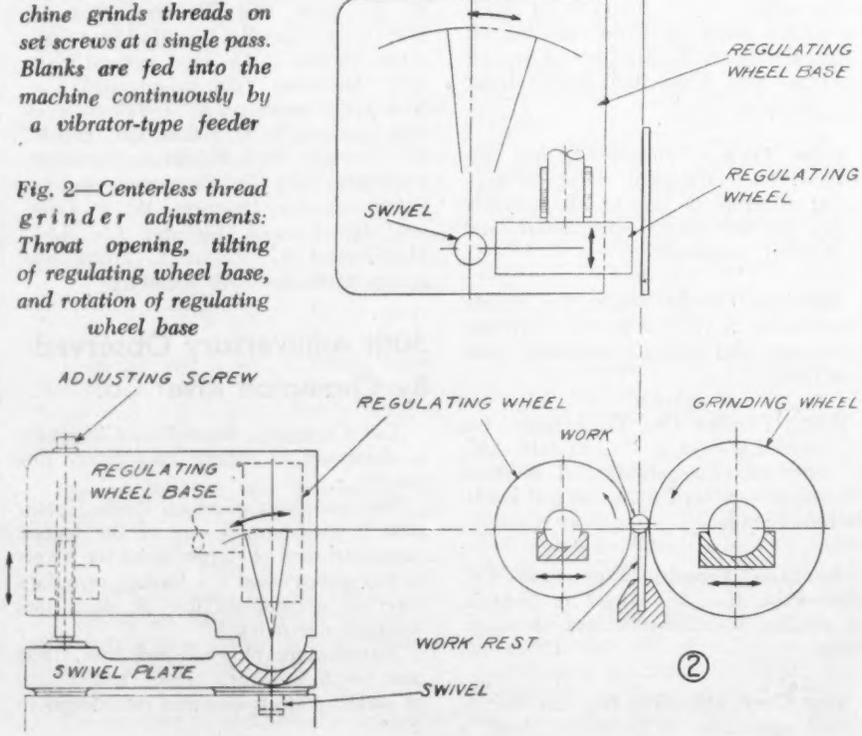
Centerless Grinder Details: The essential elements of a centerless grinder are namely, the grinding wheel, the regulating wheel and the work rest. Each of these is properly supported. The machine must permit adjustments to take care of work of different sizes, allow different rates of feed through the machine and properly position the work with respect to the grinding wheel.

The Landis Tool No. 12 centerless grinder possesses the features which are utilized in the development of the company's new centerless thread grinder.

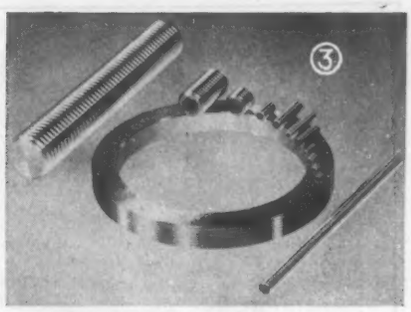
As shown in Fig. 2, the grinding wheel base may be moved laterally to increase or decrease the throat between the grinding wheel and regulating wheel. Movements of the grinding wheel base as small as 0.0001-inch may be made by means of the handwheel. The regulating wheel and its base is universal in its movements as indicated by the arrows on diagrams, Fig. 2. It also can be moved laterally as shown in diagram to increase or decrease the throat and be located as required for various diameters of work with respect to the stationary work rest. It can be adjusted forward or backward as work requires and in addition has a hydraulic traverse movement in this direction for the diamond dressing of the regulating wheel on the exact line of contact of the work. A swivel plate permits rotation of the regulating wheel base (Fig. 2) to adjust the regulating wheel parallel to the grinding wheel or at an angle if taper work is to be ground. Probably the most important adjustment and the one most often used on the centerless thread grinder is that shown at lower left in Fig. 2. The entire regu-

Fig. 1—This new machine grinds threads on set screws at a single pass. Blanks are fed into the machine continuously by a vibrator-type feeder

Fig. 2—Centerless thread grinder adjustments: Throat opening, tilting of regulating wheel base, and rotation of regulating wheel base



Thread Grinding

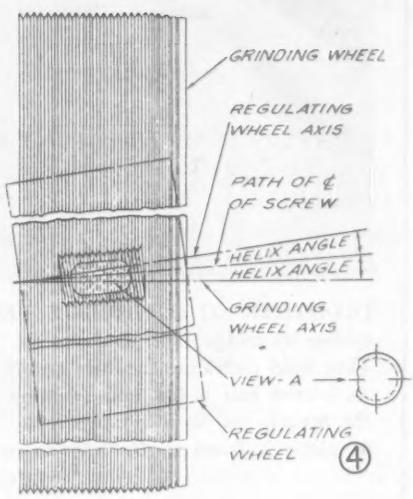


lating wheel base may be tilted to the required angle to provide the feeding action through the throat between the grinding wheel and the regulating wheel. The adjusting screw collar is graduated so the angle may be adjusted to the nearest minute of a degree.

To illustrate the feeding through action of the regulating wheel, pictures of a model of the regulating wheel mechanism are shown. In Fig. 6 (A and B) with the blade parallel with the regulating wheel axis of rotation, one half rotation of the wheel shows no axial movement of the work piece represented by a little roller. However, when the blade is placed at an angle to the regulating wheel axis, one half rotation of the wheel indicates the axial movement of the work as shown in (C and D).

The Centerless Thread Grinder: Adaptation of the centerless grinder to thread grinding involved several changes in its design. First, the crusher attachment has been built into the grinding wheel base, there being a separate motor drive for this unit. This unit is in addition to the hydraulically operated diamond dresser for the grinding wheel which is standard for the No. 12 machine. Second, an auxiliary speed reduction has been provided for the regulating wheel so that its rotative speed can be further reduced. Third, a new type work rest has been designed to meet the special requirements of thread grinding. Fourth, electrical controls have been engineered to provide flexibility of operation.

The crushing attachment houses the crusher roll which impresses the desired form or profile into the grinding wheel face. This crusher roll is driven through a worm gear reduction by a constant speed motor. A handwheel with graduated ring provides a convenient means of advancing the crusher to a definite amount into the grinding wheel face. The crushing tool is a steel cylinder which is mounted on a shaft so that when it requires replacement it may easily be removed and be replaced by a new crusher of the same groove pitch or profile. Provision is made in grinding the crusher profile to insure that all crushers made for a given pitch are interchangeable. This assures alignment with the form on the wheel. Fig. 7 shows two crushers. The one with the larger grooves is for 1-inch diameter, 8



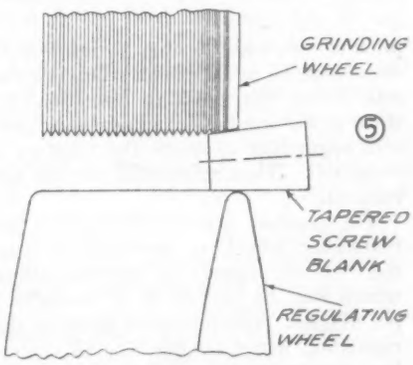


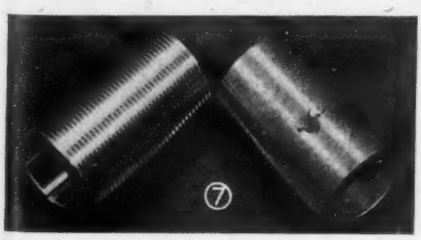
Fig. 3—Typical threads ground by the centerless method. Set screws range from ⅛ to ⅝-inch in diameter. The ring is nearly 5 inches in diameter

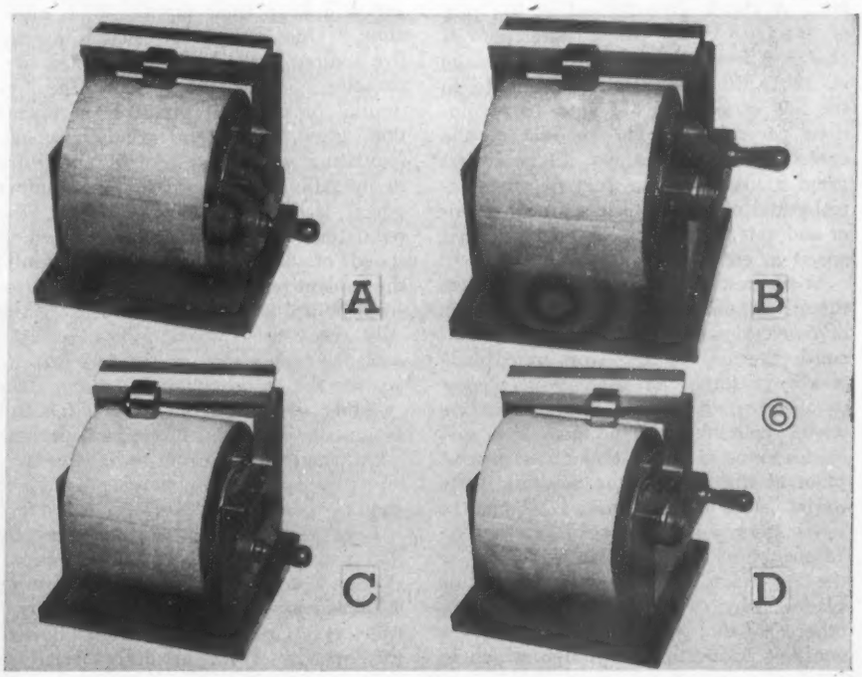
Fig. 4—This sketch shows axial relationship of grinding wheel, regulating wheel and work. Once a pitch diameter has been selected, it can be maintained within a tolerance of 0.0005-inch

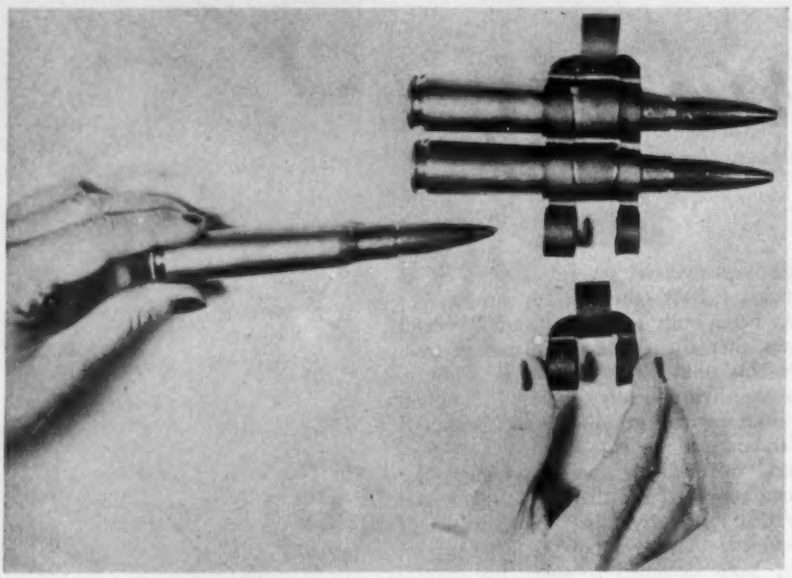
Fig. 5—Tapered hardened screw blank with small diameter entering throat between the two wheels

Fig. 6—Principles of centerless feeding-through action are demonstrated by these models. Parallel rotation of the wheels (A, B) produces no axial movement of the work piece. Note the movement resulting from the angular arrangement in (C, D)

Fig. 7—Crushers for forming thread profile on periphery of grinding wheel. Crusher at left for 1-inch diameter, 8 pitch screws; at right for ⅜-inch, 16 pitch screws







DISAPPEARING CARTRIDGE BELT: Breakaway links forming this 50-caliber cartridge belt made at St. Louis Ordnance plant are interlocking. They hold cartridges together and in turn are held together by the cartridges. As loaded belt is fed into machine gun receiver and each cartridge reaches the breech and is withdrawn from belt, one of the two links which held it in place is freed to fly into space. This feature earned for it the name "disintegrating belt"

pitch screws and the other is for ⅜-inch diameters, 16 pitch screws. Driving the roll during the crushing operation instead of driving the grinding wheel, permits regrinding to renew the form on a worn roll. Thus substantial savings are realized.

The auxiliary speed reduction for the regulating wheel is provided so that the rotative speed of the regulating wheel may be as low as 2 revolutions per minute. The minimum speed of the regulating wheel on the No. 12 centerless grinder is 12 revolutions per minute. A clutch arrangement at the rear of the regulating wheel base permits changing from the standard speed range of 12 to 96 revolutions per minute to the low speed range of 2 to 16 revolutions per minute. The rheostat on the control panel of the No. 12 centerless grinder likewise is a part of the control panel of the centerless thread grinder and can be used to obtain the desired speed in either range.

Work rest requirements in centerless thread grinding are different from those of conventional centerless grinding. Because the top of the work rest blade is always set at an angle with respect to the horizontal axis of the grinding wheel spindle, and because the side blades move in an arc about a horizontal pivot at the base of the work rest, the throat or opening through which the screw stock passes is variable on the No. 12 machine. The special work rest on the centerless thread grinder has side blades which move parallel to each other, so that the screw stock has a constant width throat through which to pass no matter what the slope angle of the blade is. In addition, time required to change the set-up from one screw size and pitch to another has been materially reduced by wedges ground to the proper slope angle for each pitch of screw. A wedge for any given set-up is placed under the work blade. The blade is clamped in place and the side blades are then adjusted for the diameter to be ground.

Electrical controls for the centerless thread grinder have been designed to meet all the requirements of operation and still keep their number to a minimum. One drum type switch having five stations is used. These stations are, namely: Set-up, where only the hydraulic pressure oil pump is in operation; grind, where the grinding wheel, regulating wheel and coolant pump are in operation; dress, where the grinding wheel is in operation as before, the regulating wheel is running at dressing speed of 300 revolutions per minute, the coolant pump and the hydraulic pressure pump are running; crush, where only the crusher drive motor and the coolant pump are running; regrind, where the crusher drive motor, the grinding wheel motor and the coolant pump are running. Proper interlocking is provided in this drum switch insuring safety of operation in moving from one station to another.

Experience gained thus far indicates that a crusher surface speed of approximately 150 feet per minute in forming a four-inch wide grinding wheel is satisfactory. Crusher life is a function of this speed. Wear or deterioration of form is due to honing action of the grinding wheel grit. Therefore the higher the surface speed, the more rapid and severe this honing action will be.

In general it takes about one minute of crushing to remove 0.001-inch from the radius of the grinding wheel. Thus, if the groove form on the face of the wheel requires renewal and if 0.004-inch of the radius must be removed, approximately four minutes will be required. Usually an extra minute is allowed during which the crusher is not fed further against the wheel. This "drifting" of the grinding wheel and roll completes sharpening of the groove form on the grinding wheel face as the pressure due to crushing is gradually relieved.

In grinding some sizes of screws it has been possible to grind for a day or more before recrushing the wheel to renew the form. The total time out required to recrush the wheel averages 10 to 12 minutes.

Diamond dressing is used for truing the wheel before any grooves are crushed into it also for dressing the chamfer or "throat" at the entrance edge after the grooves have been crushed. Chamfering of the wheel is done: First, to centerless grind the OD of the blanks before threading begins; and second, gradually to form the threads so that metal removal is distributed across the face of the wheel. Thus full depth grooves remain to clean and true the thread form of the screw as it leaves the grinding wheel.

Proper Feed Necessary

To insure that the screw will thread its way through the throat between the grinding wheel and the regulating wheel it is essential that the path of the blank shall have proper relation with respect to grinding wheel axis and to regulating wheel axis. The grinding wheel axis must be at the helix angle with respect to the path of the screw.

Grinding to a pitch diameter different from the basic pitch diameter changes the helix angle. Since the pitch of the thread is constant and dependent upon the spacing of ridges on the grinding wheel, it has been found that the set-up requirements involving the helix angle are critical. An example will illustrate this point.

The table of standards for class 3 fit of screw threads gives the following values for ¼-inch, 20 pitch:

	Basic	Min. Values
Major diameter	0.2500″	0.2428″
Pitch diameter	0.2175″	0.2139″
Helix angle	4° 11′	4° 15′

Suppose the screw blanks to be ground are less than 0.250-inch, say 0.248, then in order to centerless grind the OD some dimension must be selected and for this example 0.246-inch shall be used. The pitch diameter of the screw is to be 0.216-inch, which is a little above the average pitch diameter for a class 3 fit.

In setting up the centerless thread

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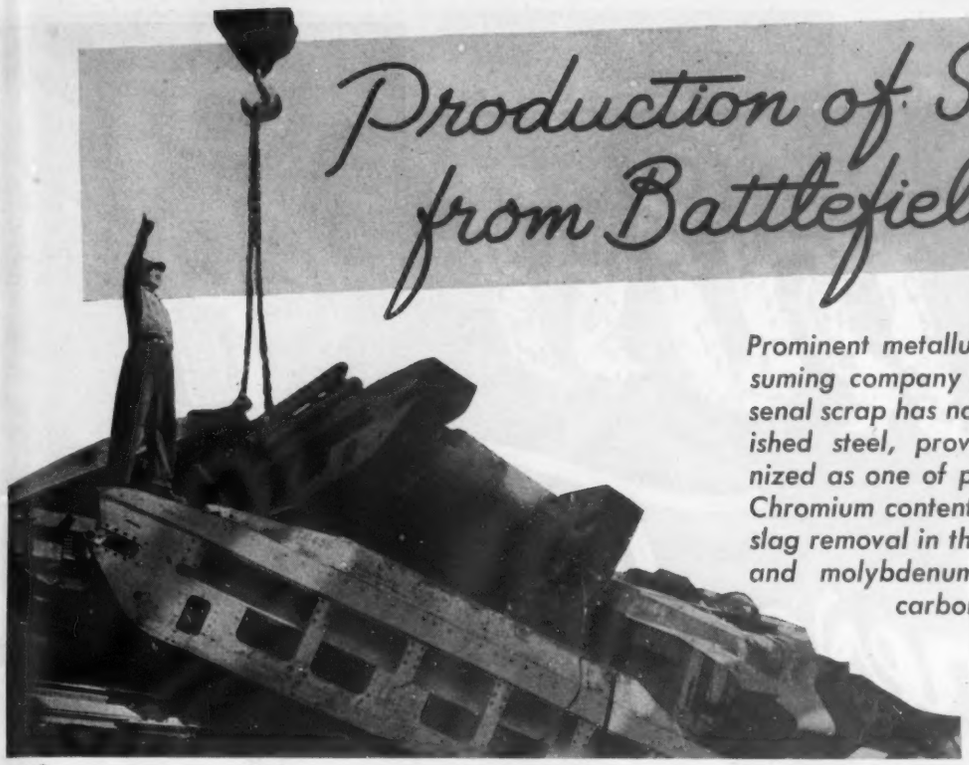
Production of Steel from Battlefield Scrap



Prominent metallurgist for large steel consuming company finds battlefield and arsenal scrap has no deleterious effect on finished steel, provided problem is recognized as one of proper scrap segregation. Chromium content can be reduced through slag removal in the open hearth and nickel and molybdenum through dilution with carbon steel scrap

ONE of the problems pertinent to the war is the utilization of ordnance scrap which may be gathered from the battlefield or the arsenal. As a rule this scrap will contain a higher percentage of alloys than is met with in ordinary domestic scrap which is derived from the NE alloy steels.

These NE alloy steels are often referred to as "lean" steels for the reason that they contain the smallest amount of alloy commensurate with the job they are called upon to perform. It is generally agreed that they do the job and do it at the least possible cost as well as imposing the least drain on our stock of strategic alloys.

Two objections could be posed regarding the use of battlefield and arsenal scrap:

(1) It contains too high an alloy content for the production of NE steels.

(2) It is contaminated with elements other than those normally desired in steel compositions.

In the first instance, the principle concern is with a high-nickel, chromium, and molybdenum content. During the melting practice nickel and molybdenum are not removed by oxidation and, therefore, remain substantially in their original proportions.

Chromium is oxidized and passes into the slag. With charges containing appreciable percentages of chromium a reversion of chromium frequently occurs when the steel is deoxidized in the furnace. This can be avoided by slag removal, a method somewhat difficult in basic open-hearth practice but nevertheless one large manufacturer of open-hearth alloy steel is doing this successfully.

After the slag is "well on" it is removed and a new slag is made from burnt lime. Even if the chromium did not revert to the metal, the chromium containing slag is too heavy and resists thinning by fluorspar additions.

The suggested remedy for preventing "off analysis" by the use of scrap high in nickel, chromium or molybdenum, especially nickel and molybdenum, is dilution with carbon scrap or by the use of high hot metal (pig iron) additions. This same open-hearth melter is using a metal proportion of about 60 per cent regularly and 80 per cent on occasion. A proportion as high as 80 per cent requires slag removal and the making of a new slag. The making of a new slag entails close slag control either by "pancake" observation or by chemical analysis of its iron oxide content.

Due to the scarcity of carbon steel scrap dilution with this alloy free scrap as a means of avoiding the production of NE alloy steels with too high an alloy content is impossible except in the case of producers fortunate enough to have access to such material.

Now we come to the second objection, that of contamination with elements not normally desired in steel compositions. It can be assumed that the following elements may be present in battlefield scrap, copper, tin, cadmium, zinc, lead; and perhaps boron and arsenic from enemy sources. It may be well to exonerate arsenal scrap from these remarks as the difficulty here lies in too high a nickel, chromium, or molybdenum content for the production of NE steels rather than to undue amounts of undesirable elements.

The presence of these elements in the scrap and their possible effect on either

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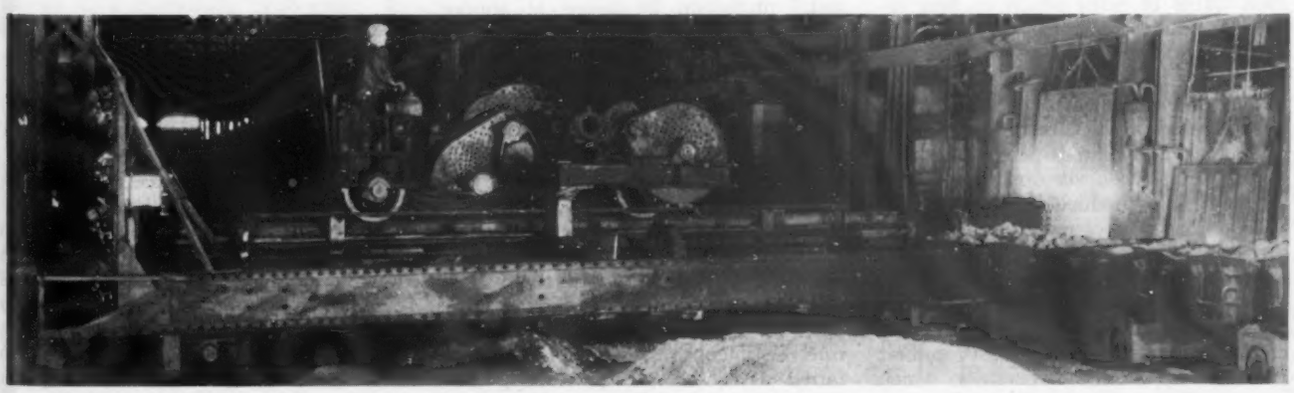

What has been learned under stress of war about proper packaging to preserve metal parts against ravages of corrosion will be of benefit in peacetime product distribution and in storage or shipment of idle machines during the postwar adjustment period. Comprehensive research by E. F. Houghton & Co., developed the facts upon which this article is based

THE air moisture type of rusting or corroding is merely one way of deteriorating metals. A quicker, more severe deterioration occurs as soon as there are corrosive fumes in the atmosphere or various chemicals on the surface of metals. These first react with moisture to form traces of acids which in turn attack metal. The metal-acid products formed again react with more moisture to form the metal hydrates or hydroxides which finally decompose or dehydrate to form the end product, rust.

Another accelerated process of corrosion occurs whenever dissimilar metals are used in a product or when various areas on one kind of metal become more active or passive than adjacent areas of the same metal. In the presence of moisture and traces of acidic or alkaline materials, this combination results in the creation of an electric cell, with resultant flow of tiny electric currents which hasten the solution of anodic areas of a product. Intermediate compounds are formed, hydrated, and finally decomposed into the end corrosion product. This type is called electrolytic or electrochemical corrosion.

Corrosion prevention is the science of metal protection by means of applied coatings or chemical treatments. Reasons for their application are essentially to preserve dimension, to preserve surface condition, and to preserve appearance. General methods for accomplishing these results include painting; plating; chemical treatments such as oxide, phosphate or sulphide coatings; porcelain enameling; special types of easily removable coatings such as oils, greases and solvent mixtures. Latter type is applied to operating or functioning metal parts to protect them during manufacture, shipment or storage, and are referred to as "temporary" coatings.

In many intermediate manufacturing steps, cleaning will be necessary to remove very evident contamination such as metal chips or dust to permit proper handling of a product in operations of measuring or gaging, operational testing or assembling. Another reason may be attainment of satisfactory appearance. But by far the most important reason for cleaning will be removal of dirt or contamination from surfaces so that protective coatings can be applied without impairment of their protective qualities.

Despite the fact need for cleaning has been universally proved and recognized in painting and metal plating, in the field of "temporary" protection with the oil or grease type of preservative compounds the need for cleanliness is not sufficiently appreciated. In most cases these corrosion preventives are rendered practically useless by application over dirty surfaces.

In practically every case, dirt is definitely corrosive, particularly in combination with traces of moisture from the air. General dust and factory dirt particles usually contain traces of corrosive acids or alkalis. Perspiration residues or traces of heat treating salts, combined with moisture, produce acidic materials which accelerate corrosion. Metallic chips or

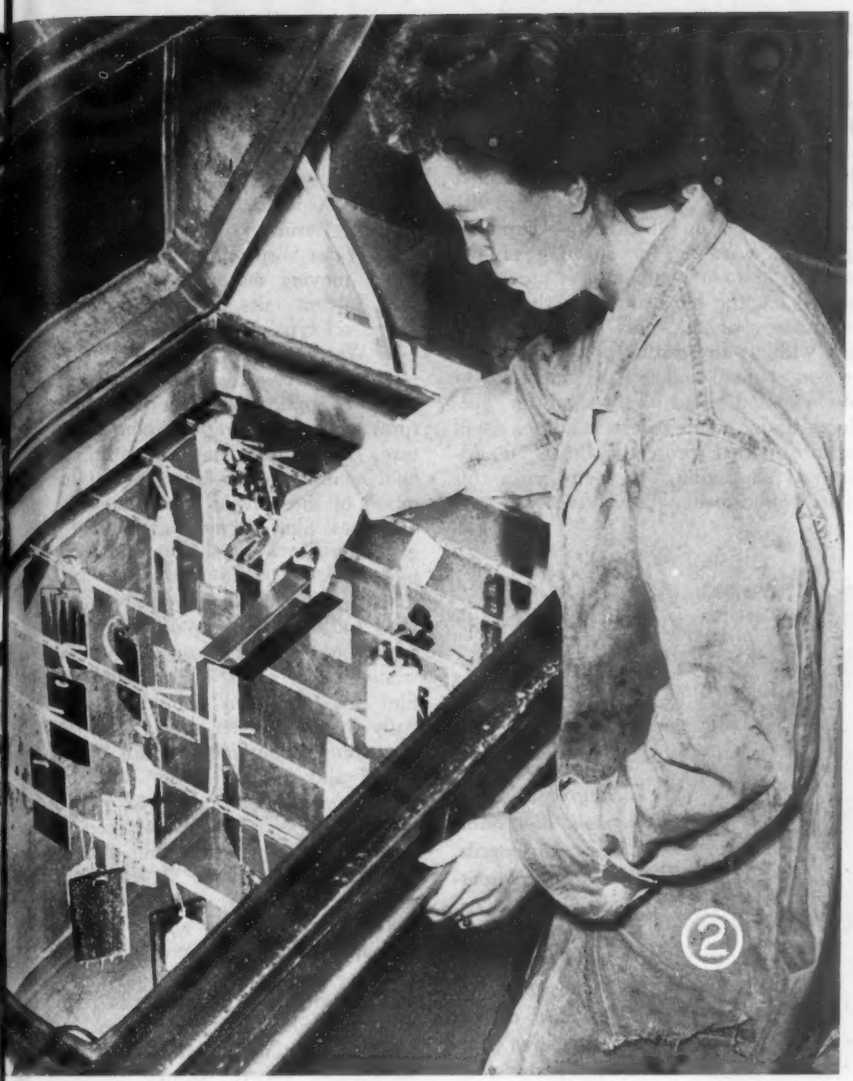

Fig. 1—Ball bearing test. Specimen at left is coated with straight petrolatum, while one at right is protected with inhibited rust preventive. Both bearings were submitted to 120-degree Fahr. 100 per cent humidity test for 1 month

Fig. 2—Accelerated effect of salt air or water is produced in this salt spray cabinet, concentration and temperature being accurately controlled. Heated salt water is atomized and blown through closed cabinet by compressed air

grinding dust also create corrosive conditions through galvanic or electrolytic action. Cutting and cooling compounds bring water into contact with metal and deposit chemicals slowly converted to acidic compounds. Carbonized organic residues and scale prevent intimate preservative contact. Soldering or brazing flux residues, and chemical fumes from processing departments or from the burning of fuel, when combined with moisture, will present severe corrosive conditions. All of these substances in conjunction with moisture corrode metal products at a rate from ten to a hundred-fold that of the simple combination of moisture and air.

Of the several methods of cleaning which fall naturally under the broad heading, mechanical and chemical treatments are the major subdivisions, each embracing an extensive list of equipment and preparations. It is with one of these chemical methods (solvent, alkali, emulsion and electrocleaning) which remove dirt by solution, saponification, emulsification or a combination of these effects, that most of the industrial cleaning of metal products is accomplished. This method is alkaline cleaning, so named because the original applications were simply hot caustic soda or caustic potash solutions. Cleaning was accomplished by chemical reaction of the caustic with vegetable or animal oil dirt to form soluble products. It was ineffective on mineral oil or other residues, which would not react chemically or dissolve. Further, it was likely to be corrosive unless thorough rinsing followed.

Today, alkaline cleaning has broadened to include many other substances like alkali silicates, phosphates, borates and carbonates. In combination with soap or with the recently developed synthetic wetting agents, this method has outmoded the old caustic cleaners as much as the automobile has outmoded the horse and buggy.

Used as solutions in nearly boiling water, the new cleaners work by solution, chemical reaction and emulsification to remove animal, mineral and vegetable oil contaminations, as well as water-soluble dirt. Hence, residues of heat treating salts, acid perspiration deposits and other inorganic dirt, plus oil or grease films, are readily removed. The process sometimes is speeded by using electrocleaning methods in conjunction with it. Electric current is employed to liberate from the surface of the work hydrogen or oxygen gas bubbles which, in their formation, exert a detergent effect and rush to the surface of the cleaner with a light agitating, brushing or wiping action which aids cleaning. Both alkaline and electro cleaning methods complete their functions in a single stage. Adequate rinsing must follow in every case.

There are two general types of emulsion cleaners. One is a combination of organic solvent and water kept in a thoroughly dispersed state by surface active or emulsifying agents. This usually is applied as a spray for more effective cleaning, but it can be used as an immersion cleaner. A specialized type of emulsion cleaning consists of applying a mixture of petroleum solvent and surface active agent to the product being cleaned and then rinsing with high-impact water sprays or steam jets, particularly suitable for cases of thick, heavy oil or grease contamination. In all instances, no cleaner residues should be allowed to remain, as combination of alkaline cleaner or chlorinated solvent residues with moisture eventually will cause rusting, and even petroleum solvent traces tend to thin and reduce maximum effectiveness of applied corrosion preventives. Application of a preventive should follow immediately the drying of parts.

Corrosion Preventive Materials

In too many instances ordinary lubricating oils, fats, and greases are accepted as preservatives. Extremely poor in corrosion preventive properties, they merely coat metals without forming any attachment strong enough to prevent transmission and contact of various corrosive substances. Even though the main constituent in special preventives may be these same oils or petrolatums, they are designed with added chemical compounds to give proper resistance. These additives, called surface active agents or inhibitors, thoroughly "wet" the metal surfaces, forming strongly adhering, continuous, intimate films which operate by absorption or even by chemical reaction, to resist displacement from the metal.

These special preventive compounds may be divided into four general groups: (a) Grease type, (b) oil type, (c) solvent type, and (d) "strippable" plastic type, each having specific properties for particular application and designed to fit a

definite class of product for a given set of conditions.

Obviously, the first division covers quite a range of materials, from the very soft, greasy or petrolatum type compounds through the very heavy, hard, wax-like compounds, the former type with lower melting point being designed for moderate shipping and storing temperatures. Whenever higher temperatures are expected during shipment or storage, the latter type should be used. Preventives of the grease type are nearly always applied to products by dipping the product in tanks of melted corrosion preventive. Coatings formed may vary from 0.015-inch to 0.050-inch, attaining their final consistency by cooling. Assuming a properly applied continuous film, protection is excellent for long periods of both indoor and outdoor exposure.

The group of oil-type preventives includes non-drying, non-setting preservatives. Various weights or viscosities of oil are available. However, even with the heaviest, coated and properly drained protective films will not exceed 0.001 or 0.002-inch in thickness. Dipping, spraying, brushing, or slushing of the material at room temperatures are easily carried on, the films attaining their final consistency or thickness only by draining, without any setting or drying. Protection is good and will be adequate in less exposed areas, but exposures outdoors under more severe conditions will require added protection such as additional packaging. In many cases this type of corrosion preventive will not have to be removed from a product before it is placed in operation.

For convenience, the solvent-preventive group may be subdivided according to solvent used and type of material dissolved in the solvent as follows:

1. Dry type films—
   (a) Asphaltic
   (b) Resin.
2. Water displacing, fingerprint removing materials.
3. Solvent cuts of wax, grease or oil type.
4. Water soluble type.

They all have a common property in ease of application either by dipping, spraying or brushing at room temperature. Likewise, they all attain their final coating thickness or set by evaporation of the solvent from the film. In all cases films formed are fairly thin, generally not exceeding 0.003 or 0.004-inch.

Because solvent type preventives tend to evaporate rapidly on standing, tank holding solution should be covered when not in use. To maintain correct film thickness, tank should be checked daily by hydrometer readings or by determining percentage of solids by evaporation and adding solvent to compensate for evaporation. Protection afforded by this type is excellent even under severe conditions, matching that given by heavy grease type. It will withstand abrasion and handling but is somewhat difficult to remove, actual wiping or brushing with a solvent being necessary.

Water-displacing, fingerprint-removing type of thin film materials usually contain substantial quantities of soap-like substances which remove droplets or films of water from metal surfaces by "preferential wetting" of the surface. Water is displaced by superior attraction of the preservative toward the surface. This type is commonly used to

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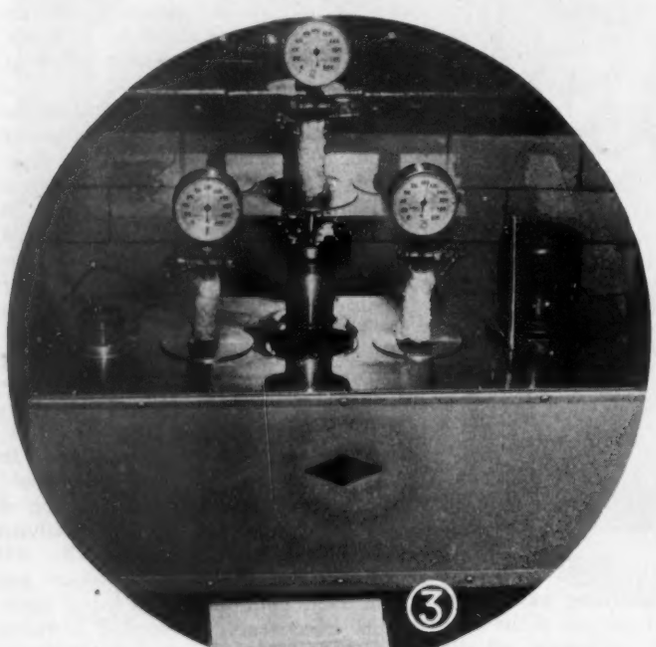

Fig. 3 — Tests and equipment for determining cause, kind and degree of corrosion are numbered in dozens. Here is Norma-Hoffmann "Oxidation Bomb" used to determine oxidation stability of rust preventive compounds

RUST PREVENTIVES COMBINING PROTECTIVE AND LUBRICATING QUALITIES

Designation	Description	Application	Tests		Use
			Humidity	Salt Spray	
1. [1]AXS-674 Rev. 2 (Houghton Cosmoline 935 or Cos. AXS-674)	Inhibited lubricating oil SAE 30	Spray, brush or dip at room temperature	300 hrs. 100% Hum. at 100 deg Fahr.	20 hrs. synthetic sea water immersion	For highly finished operating surfaces, except internal combustion engines.
2. [2]AXS-934 Rev. 1 (Cosmoline 946-Grade 1 Cos. 947-2)	Inhibited preservative engine oil Grade 1-SAE 10; 2-SAE 30. Must pass 36 hr. engine oxidation stability test	Same	200 hrs. 100% Hum. at 100 deg. Fahr.	Same	Preservation of lubricating and coolant systems of all types production equipment requiring SAE 10 or 30 oil. Preservation internal combustion engines, air compressors, etc. Not for aircraft engines.
3. [3]An-VV-576a (AN-VV-C-576a Amend. 2) also Cosmoline 900A	"Satisfactory lubricant" for aircraft engine operating at not over 50% rated power. Never used straight	Internal Addition	150 hrs. 100% Hum. at 120 deg. Fahr.	None	For mixing 1 to 3 with approved lub. oil spec. AN-VV-O-446a. Gr-1120. Combined product also supplied as Cosmoline 1123.

[1]Viscosity 500-600 at 100 degrees Fahr. Approx. 60-70 at 210 deg. F. Removable with dry cleaning solvent. 1-A packaging prescribed for additional protection.

[2]Viscosity Gr. 1-200 at 100 deg. F. approx.; 48 at 210 deg. F. approx.; Gr. 2—475 at 100 deg. F. approx.; 60 at 210 deg. F. approx. Pour point —minus 10 deg. F. max. Volatile matter—2% max. Shall be compatible with all engine oils under USA 2—104B.

[3]Flash point—350 deg. F. min. Pour point—20 deg. F. max. Viscosity 100-125 at 210 deg. F. V.I.—95 min. (mixture). Carbon residue—5.5% max. L00-hour endurance test must shown no discoloration or corrosion.

Lubrication in Deep Drawing Metals

In Part III of this series, the author discusses application of lubrication theory to deep drawing, effect of engineering and metallurgical factors conducive to excessive welding of work and tools, prevention of buildup and seizure, and an interesting hypothesis on the mechanism of metal buildup on tools

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IN the drawing of metals through dies, it may be assumed that unit pressures are very high, as the forces applied must be sufficient to exceed the yield strength of the metal. It should be possible, therefore, to apply a good deal of the information on boundary and extreme pressure lubrication that has been discussed in preceding installments. It was previously mentioned that, in the case of boundary lubrication, friction is independent of speed over a wide range of speeds.

This has been used as one criterion to determine that lubrication is of the boundary type in metal drawing. In the case of wire drawing, it has been found that friction is independent of the speed of drawing over a range of 20 to 600 centimeters per second[43]. In addition, the relatively high proportion of energy ordinarily lost due to frictional resistance indicates that fluid lubrication conditions are not being obtained. In this connection Giraud found, by immersing a wire-drawing die in a calorimeter, that frictional losses were in the order of 50 per cent or more[44].

Some investigations by the writer[51] have confirmed this magnitude of frictional losses in cartridge case drawing even when lubricants used are fairly good. Frictional resistance of this magnitude indicates that a good deal of metal welding must be taking place and, consequently, the methods for reducing welding discussed under extreme pressure lubrication are directly applicable to deep-drawing lubrication. In addition to the large amount of heat generated as a result of frictional resistance, there is also a considerable amount of heat generated due to the deformation of the metal so that it is common knowledge that work subjected to severe "cold" drawing operations comes from the dies too hot to handle with the bare hands and surface temperatures probably are extremely high on the basis of the previously discussed data obtained by Bowden and Ridler[45]. This high temperature makes boundary lubrication much more difficult because of disorientation of polar films[49] so that in some cases the combination of high pressure and temperature makes it necessary to utilize all of the best drawing lubrication practices in order to obtain tool life that is even moderately high.

The difficulties that may be encountered due to poor lubrication during deep drawing operations are:

—Excessive welding between work and tools. This manifests itself either as bulk tearing of the surface of the tools and work or as build-up of portions of the worked metal on the tools. This built-up metal work-hardens and then causes subsequently drawn pieces to be scratched.

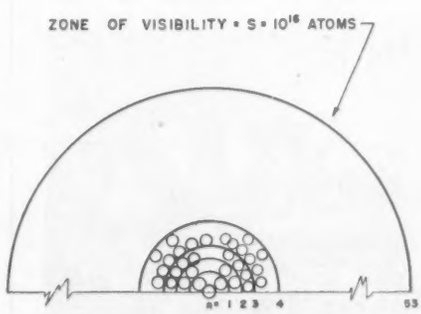

Fig. 4—Graphic presentation of a hypothesis on the mechanism of metal build-up on tools. Following formation of individual welds between work and tool, atoms picked up by tool in turn pluck other atoms from succeeding work pieces. Increasing rate of enlargement of built-up area continues in the subdivided range, but at some point the magnitude of built-up area passes zone of visibility, with about 10^{16} atoms or approximately 0.00006-gram. (*See page 164*)

—Excessive lubricant friction or resistance to stress deformation of the lubricant.

—Improper flow of metal.

—Sufficient wear of tools for parts to become oversized, either because of polishing to recondition the tools or because of gradual wear.

The second factor is of minor importance unless the first factor has been reduced to a minimum. The ratio or relationship between the first two factors will usually determine the third. The last factor also is intimately related to the first two.

Of obvious importance in predetermining lubrication for deep drawing is the type of metal, its mechanical properties and metallographic structure and the nature of its surface. The higher the yield strength of a metal, the greater will be the force required for plastic deformation and the greater will be the unit pressures which the lubricant will be subjected to. Consequently, any factor that affects yield strength will affect lubrication. In addition, the similarity or dissimilarity between the metal being worked and the metal used as tools to a considerable extent determines the tendency for welding between surfaces, as with dissimilar metals lubrication is less of a problem[6].

Usually pure metals or single-phase alloys can be deformed more readily than multiphased alloys. When an alloy contains two or more constituents, the difficulties that may be experienced are dependent upon the distribution and size of the unit particles. An example may be cited to illustrate the point. Low carbon steel, which is practically a single-phase alloy, contains few carbide particles and requires relatively low forces for deformation. A medium carbon steel containing fine pearlite is a two-phase alloy and requires relatively high forces for deformation. On the other hand, a medium carbon steel having the same carbon content as before but having the carbon (carbide) distributed as spheroids in an iron matrix requires forces intermediate between the stated two conditions. For the medium carbon steel, the latter structure is more favorable so far as the lubrication problem is concerned.

In certain cases in which one of the constituents is concentrated at the grain boundaries, and becomes a continuous envelope around the grains, such as is obtained when very small percentages of bismuth are present in brass, a great decrease in ductility will be experienced. In other cases, segregation of certain im-

purities at critical areas may be the cause of tearing of the metal. Preferred orientation, metal defects such as laminations, seams, and inclusions, or excessive grain size, may also have this effect. In any event, torn pieces of metal may remain in the die and cause welding, even with normally optimum lubrication. While this cause may be immediately recognized in most cases, there are times when the torn metal passes through the die after causing the trouble and the lubricant is blamed.

In attempting to attain optimum metallographic structures for desired applications, metal is annealed, normalized, spheroidized, patented, etc.,[47]. The proper arrangement of these treatments is very important in determining the drawing forces and the type of lubricant that must be used for any specific operation. For a particular metallographic structure necessary to obtain certain physical properties, it frequently is possible to control these heat treating procedures so as to procure minimum forces and thus reduce lubrication difficulties. It must be understood, however, that when exceptionally high physical properties are required, the metal usually cannot be treated to minimize lubrication difficulties and it is then necessary to devote greater attention to lubrication in order to obtain satisfactory performance.

Under certain conditions the hardening of metal upon storage causes difficulty, as in the case of certain age hardening alloys. Where subsequent drawing is to be conducted on such alloys, immediate redrawing should be conducted or the alloy should be stored at low temperatures and for as short a period of time as is feasible. Pure aluminum and certain of its alloys have a low rate of work-hardening and consequently may be subjected to a series of drawing operations without intermediate anneals, without requiring markedly increased drawing forces. Other metals, such as brass, plain carbon steels, and, to a greater extent, austenitic or stainless steel, work-harden so rapidly that they usually must be annealed between operations and may require increased forces during part of the single drawing operation.

The formation of excessive deposits of hard, non-ductile materials, such as oxides of iron, brass, and aluminum, causes increases in the forces required for deformation. When the brittle oxide coating becomes too thick, it may crack as the softer metal underneath is plastically deformed, resulting in the extrusion of unprotected metal to the surface where welding may take place. Excessive decarburization on the surface of steel resulting in the formation of a layer of soft pure iron also tends to cause welding to take place more readily than the original steel[48].

The occlusion of hydrogen during pickling causes steel or iron to become brittle. This embrittled steel requires higher forces for deformation and may tear during the draw. It has been reported that this hydrogen embrittlement may be reduced by heating at moderate temperatures (200 to 400 degrees Fahr.) for 5 to 60 minutes.

In the case of the surface of metals being drawn, it is advisable that this be quite smooth, yet not so smooth that a mirror finish is obtained. Optimum results usually are obtained when surfaces are slightly roughened after drawing by a light pickling or sand blasting operation. This has been ascribed to the better retention of lubricant by slightly rougher surfaces. This must be balanced against the poor frictional characteristics of rough surfaces. In this connection, annealing in controlled atmosphere furnaces is frequently a source of trouble since it may result in surfaces that are too smooth[49].

In addition to the nature of the metal being worked, the type and severity of the drawing operation determines to a considerable extent the lubrication difficulties that may be encountered. Drawing operations vary from those which consist mainly of bending or shaping—in which the stretching of the metal occurs over a relatively small portion of the total area while the reduction in area and wall thickness is very small—to those in which there is a great reduction in area and wall thickness due to ironing or flowing of the metal between tool surfaces. In the case where stretching of the metal takes place over a limited area, lubrication may be very critical, because, on the one hand, localized high-unit pressures are frequently encountered and, on the other hand, too low a coefficient of friction may sometimes be disadvantageous because the ease of slippage may cause tearing or wrinkling to take place[49].

Tool Design Important

Design of tools is very important in determining the severity of drawing operations. Sharp corners on dies may be the cause of localized high unit pressures. The rate of reduction of the metal, i.e., the slope of the reducing portion of the die, also is important in determining unit pressures, and in this connection, it has frequently been found advantageous to use longer dies or dies placed together in tandem instead of single, short dies in which the rate of reduction of metal is high. Appropriate clearances also are important so that unnecessary sliding friction may be avoided. This is especially important because of the tendency for metals to spring back after being elastically deformed by the tools.

The nature, hardness, and surface condition of the tools are important factors determining the tendency toward welding of the tool with the metal being worked. The tendency for hard metals to weld is less than that for softer metals. In obtaining hard steel drawing tools, a limit of maximum hardness obtainable (rockwell C67) is reached by quenching, and the brittleness of these hard steels upon being subjected to impact. By appropriate quenching and tempering techniques and selection of steels, it is sometimes possible to obtain maximum hardness at the drawing surfaces, while the bulk of the tool remains much softer and supplies the necessary toughness to resist impact. However, for general practice, an attempt usually is made to temper steel drawing tools to a hardness of rockwell C62-63 to obtain toughness as well as hardness. A difference in hardness of from rockwell C63 to C67 has been found to cause important differences in tool life in some lubrication studies by the writer on steel cartridge case drawing.

It is possible to increase the surface

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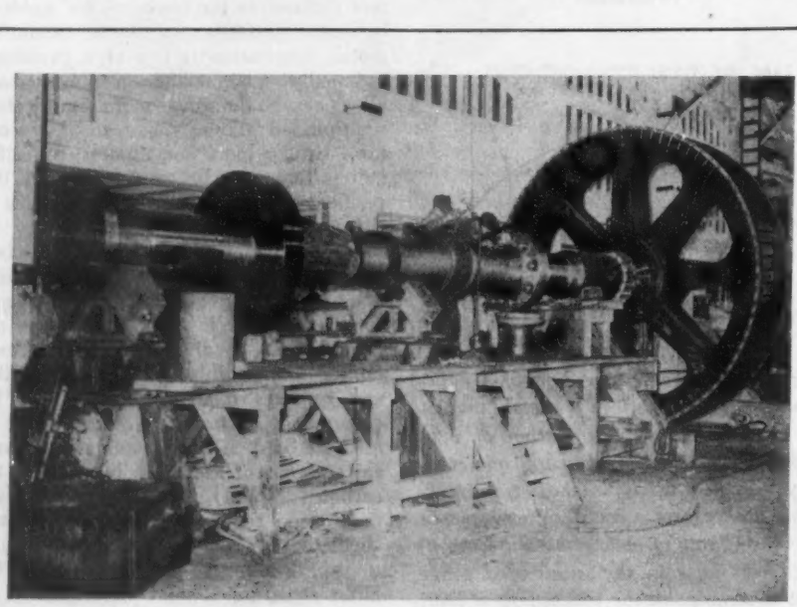

FITTING UP PRIME MOVER: Thrust shaft is fitted on to rotor and shaft of 6000-horsepower propulsion motor for high-speed tankers in General Electric's Swan Island prefabricating shop at Portland, Ore. Three quarters of the turbine-electric propulsion equipment for these vessels ordered by the Maritime Commission since the U. S. entered the war are being built by the company

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SHOT for Metal Peening

Materials used in metal peening include chilled iron shot, malleableized chilled iron and a special heat treated shot. Third type has improved resistance to fracturing and hardness ranges suitable for majority of applications. Steel shot is costly and generally not available

GROWING interest in improving the fatigue endurance of metals and alloys by shot peening has served to focus attention on the shot used. Interest in the shot is principally along the lines of what material has been used, what materials are now available, and also what materials could be made available: First, at a reasonable cost, and second, at an increased cost but yet at a price commensurate with the benefits to be obtained by metal peening.

The shot which has been most readily available in quantity and at moderate cost has been a chilled iron, although the product is frequently referred to in the commercial trade as steel shot. It is not of the typical analysis used in the production of white iron castings for use as such or in the production of white iron castings which are to be malleableized.

The analysis is more nearly what is known in industry as gray iron but because of the rapid cooling in a shotting process the product has a white iron structure in spite of the fact the composition is such that in sand or chilled castings the structure would be gray or at least mottled. Shot which we have examined show an entirely white iron structure with cementite and austenite or martensite as the constituents. The microstructure typical of chilled iron shot is shown in Fig. 1. The white areas are cementite while the dark areas are austenite-martensite. All specimens were etched in 4 per cent nital.

The composition of chilled iron shot is usually in the following range: Carbon 3.20 to 3.60 per cent; manganese about 0.30 to 0.50 per cent; silicon about 1.40 to 2.2 per cent; phosphorus about 0.30 to 0.60 per cent and sulphur about 0.07 to 0.17 per cent. The composition is a function of the stock used in the charge to the cupola and the temperature and rate of melting. When the charge is made up of more or less miscellaneous cast iron scrap this is reflected in the analysis and the same is true as the amount of steel or pig iron of different types is varied in the charge. In addition to the above-mentioned composition shot frequently will carry small amounts of the alloying metals which are used in cast iron, and these may include copper, nickel, chromium, molybdenum, and vanadium. As a rule, however, the amount of these metals in the shot will rarely exceed a total of 0.10 to 0.20 per cent, with the amounts of the individual metals decreasing to a trace in the order mentioned above.

There has been definite use of copper added to the charge, most frequently in the amount of about 0.25 to 1 per cent, and numerous tests have shown that copper improved somewhat the resistance of shot to fracturing in repeated hammer tests. (Covered by U. S. Patent 2,218,-107—Oct. 15, 1940). Certain patent literature has disclosed and claimed the use of combinations of the metals, chromium, nickel, molybdenum and vanadium, with the metals being used in combinations of 2, 3, and 4 of these metals. No information is available to the writers as to the

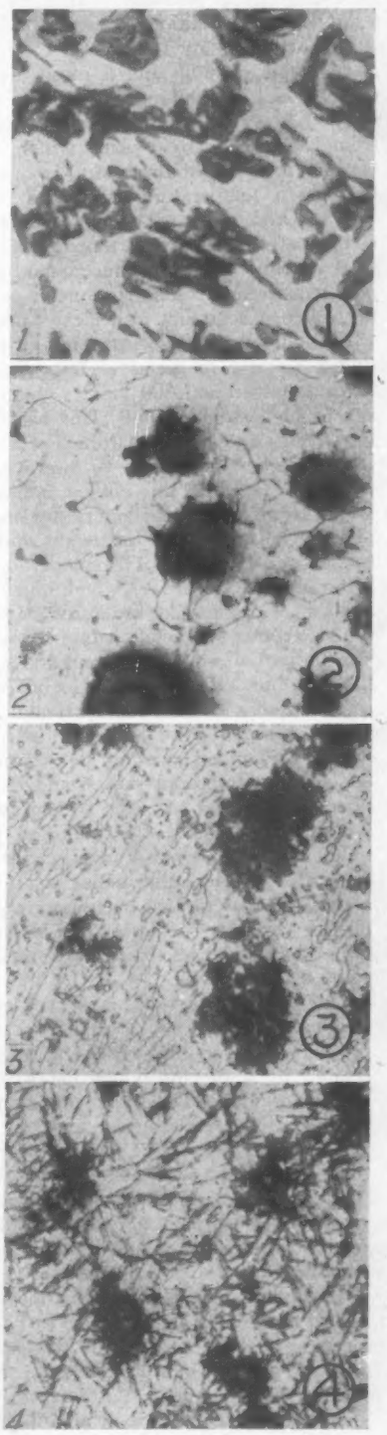

Fig. 1—Microstructure of chilled iron shot at X2500

Fig. 2—Microstructure of completely malleableized chilled iron shot at X1000

Fig. 3—Microstructure of partially malleabilized chilled iron shot showing cementite, ferrite, and temper carbon. Taken at X1000

Fig. 4—Microstructure of malleableized and quench chilled iron shot showing martensite and temper carbon. Taken at X1000

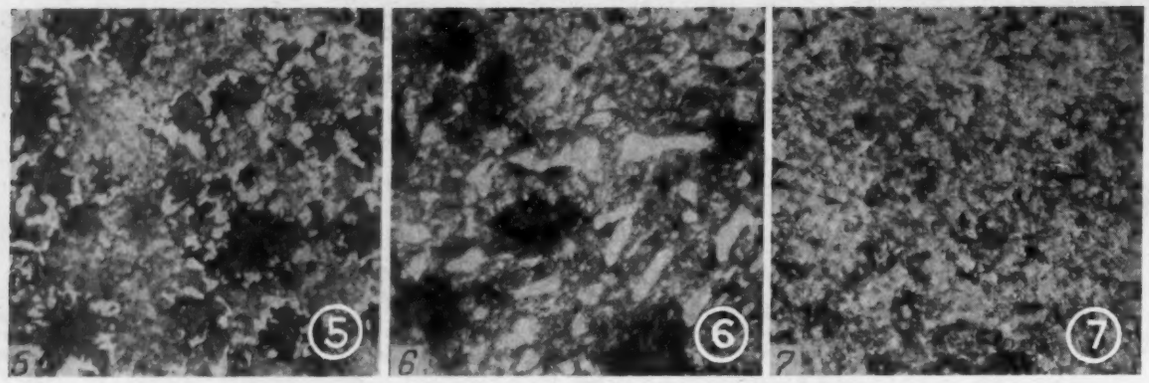

Fig. 5—Microstructure of malleableized chilled iron cooled to form ferrite and pearlite, at X500

Fig. 6—Microstructure of partially malleableized chilled iron showing residual carbides, martensite (troostite), and temper carbon, at X1000

Fig. 7—Microstructure of quenched and tempered chilled iron shot, at X500. All data and photomicrographs courtesy of American Society for Metals

extent to which shot conforming to these patents has been produced or as to the beneficial effects resulting from such intentional alloy additions.

Grit which is used in metal cleaning is made by crushing and is mostly from the chilled iron product. There is on the market, however, a grit which is made from high-carbon steel plate, which, according to a patent disclosure, is heated to a high temperature, quenched, and then crushed to grit. This, however, represents a relatively small tonnage of the total amount of grit produced, and grit is not considered usable for metal peening, since it scratches rather than peens.

The chilled iron shot as normally produced for use in metal cleaning has a hardness of around 800 vickers and may run as high as about 900. This hardness is well in excess of the hardness of metal parts which it is desired to improve by peening. However, this chilled iron shot is far from being satisfactory for metal peening because of its brittleness and its tendency to fracture or "explode," as it is termed in the trade, when impacted against a hard surface. Fractured shot are quite effective for metal cleaning, providing the particles do not become too small in size, but these shot fragments with sharp corners tend to cut the metal and would, therefore, not serve the purpose intended in metal peening. The harmful effects from fractured shot would be reduced somewhat if the system were equipped to remove the fractured particles, but this has not always been done. In spite of the objections mentioned above, this material has been used in most of the work in shot peening. However two other materials have been used to some extent.

One of these materials is a completely, or almost completely, malleableized shot of the usual analysis, while the other is treated by a process which controls the degree of malleableization, and subjects the shot to a quenching operation, and may further subject it to a tempering operation, to develop a desired hardness. The malleableized shot, if the process is carried to completion, will be quite low in hardness, with values corresponding roughly from 150 to 200 brinell.

Obviously, shot of such hardness are quite limited in application for metal peening because most of the steels to be peened will have a hardness in excess of 200 brinell, and it is, therefore, evident that relatively little, if any, improvement could be effected by impacting with shot of lower hardness. Furthermore, the shot of so low a hardness is deformed in service and no longer is so round as seems desirable for peening.

The second product mentioned is made by subjecting shot to heating at temperatures in the range of about 1350 to 1600 degrees Fahr. for a time sufficient to bring about the desired degree of decomposition of the massive cementite in the original chilled iron and then cooling at a rate to produce the desired hardness (U. S. Patent 2,184,926—Dec. 26, 1939). The rate of decomposition of the cementite increases with increase in treating temperature and, for the usual analysis, is quite rapid (½ to 1 hour) at 1600 degrees Fahr. and can be effected at 1350 degrees Fahr. in 3 to 4 hours.

The structure produced is one of temper carbon distributed in the matrix, and the character of the matrix is a function of the temperature from which it is cooled and the rate of cooling. It may be largely martensite or it may be entirely pearlitic, and if the cooling is arrested at the proper temperature for completion of the malleableizing operation, the structure may be largely ferrite and temper carbon. With a drastic quench, hardness of the order of 500 to 600 brinell equivalent are produced, and then the hardness can be reduced to desired lower values by well-known tempering treatments. Thus, this method of treatment is capable of producing shot with hardness easily within the range of 200 to 500 brinell equivalent, with the structure principally that of steel, but with temper carbon distributed through it.

Typical microstructures of shot of originally chilled iron, but after various heat treatments, are shown in Figs. 2 to 7. The toughness of the shot described is greatly superior to that of the ordinary chilled white iron of commerce but is probably somewhat inferior to steel, although that relation has not been determined by the authors. As would be expected, the toughness of the shot decreases somewhat over the higher hardness range, but this trend is not noticeable up to a hardness of around 400 brinell equivalent, and it is possible to deform the shot substantially by hand hammering up to 450 brinell equivalent, without fracturing.

It is indicated by those working on shot peening that shot in the whole size range from about 0.01 to 0.10-inch in diameter may be required, but the principal demand probably will be in the range of 0.015 to 0.030-inch. It is possible to produce all of these sizes in the shotting process, but it may be difficult to produce the desired amounts of some of the sizes, particularly if there should be a large demand for shot in the diameter range of 0.015 to 0.020-inch, or 0.030 to 0.040-inch, for example. An excessive demand for particular sizes would mean that the shot would have to be screened before the heat treatment and the sizes not in demand for metal peening diverted to other applications. The nature of the shot peening process makes it desirable to have the shot of uniform diameter within close tolerances and supplied to a specified diameter. This has not always been done but is possible by suitable screening processes.

This heat treated malleableized shot does not meet all of the specifications being mentioned by users of shot because, when the shot is made to have a hardness in excess of some of the parts to be treated, it becomes somewhat brittle and will undoubtedly produce some fracturing in service. However, these specifications probably will not be entirely met should they go to a steel shot which would be much more expensive.

So far as is known to the authors, steel shot is not now being produced by a shotting process comparable to that used in the production of chilled iron shot. However, at one time a plant was melting high-carbon steel in an electric furnace and shotting it to produce steel shot for use in the granite industry. That plant is thought to have been out of use for

(*Please turn to Page* 172)

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At Gardner-Denver

Complete inspection at many production stages assures perfect interchangeability of drill parts. Tolerances of 25/100,000-inch held on many parts

IN MORE than 40 countries where mining is done, Gardner-Denver drilling apparatus will be found serving some 850 individual mines. Recently, at the Climax Molybdenum Co. Colorado mines, some 6500 holes of 12-feet average depth, representing 14¾ miles of drilling, were drilled for 78,000 sticks of dynamite to loosen in a single blast a block of rock and ore 300 x 300 x 250 feet. This work was done by Gardner-Denver drifters. Production of molybdenum ore at this mine, by the way, is now around 24,000 tons per 24 hours—1000 tons an hour.

The present Gardner-Denver Co. is a merger of the Denver Rock Drill Mfg. Co., and the Gardner Governor Co. Its Rock Drill Division plant, located mile-high at Denver and employing 650 metal workers, is a model of flow efficiency. It produces an unusual volume of work per square foot; has stressed centralized inspection for years and maintains nearly 10 per cent of its factory employes for this purpose. Undoubtedly its good housekeeping, completeness of facilities and emphasis upon inspection were factors that so favorably inclined the AAF to depend upon it for the extensive production of hydraulic actuating cylinders.

There are 10,000 parts in float here, requiring an efficient centralized tool-and-gage control system. Its main departments are tool, drill and mill, turret lathe, automatic screw, grinding, die, burring, chromium plating, welding, drop hammer, heat treat, lathe and shaper, and broaching, in addition to engineering, tool design and experimental departments. Its physical and chemical

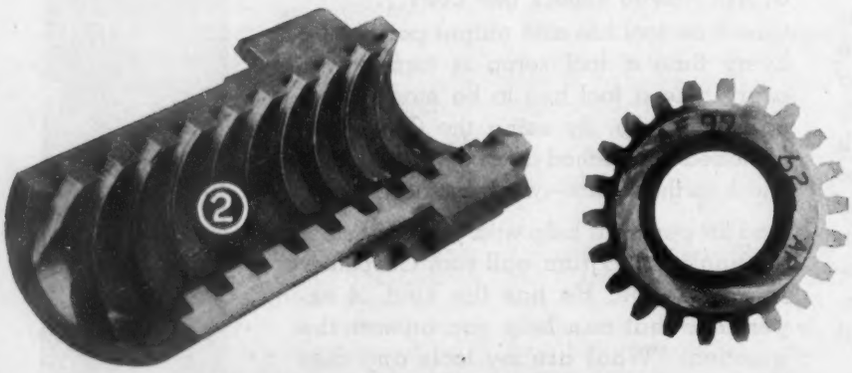


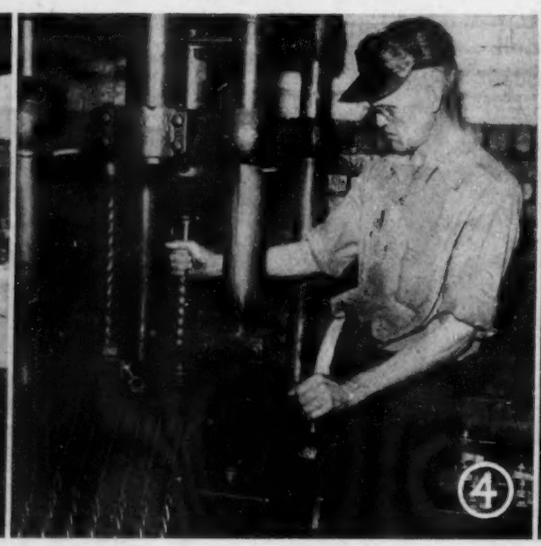
Fig. 1—Testing automatic feed drifter at test tunnel, Idaho Springs, Colo.

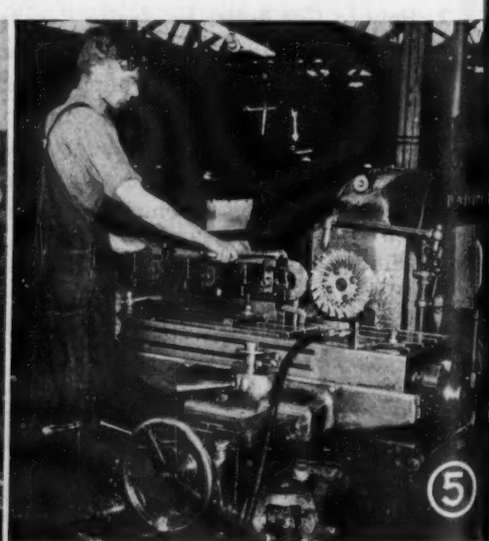
Fig. 2—End view and sectionalized view of feed nut for automatic feed drill

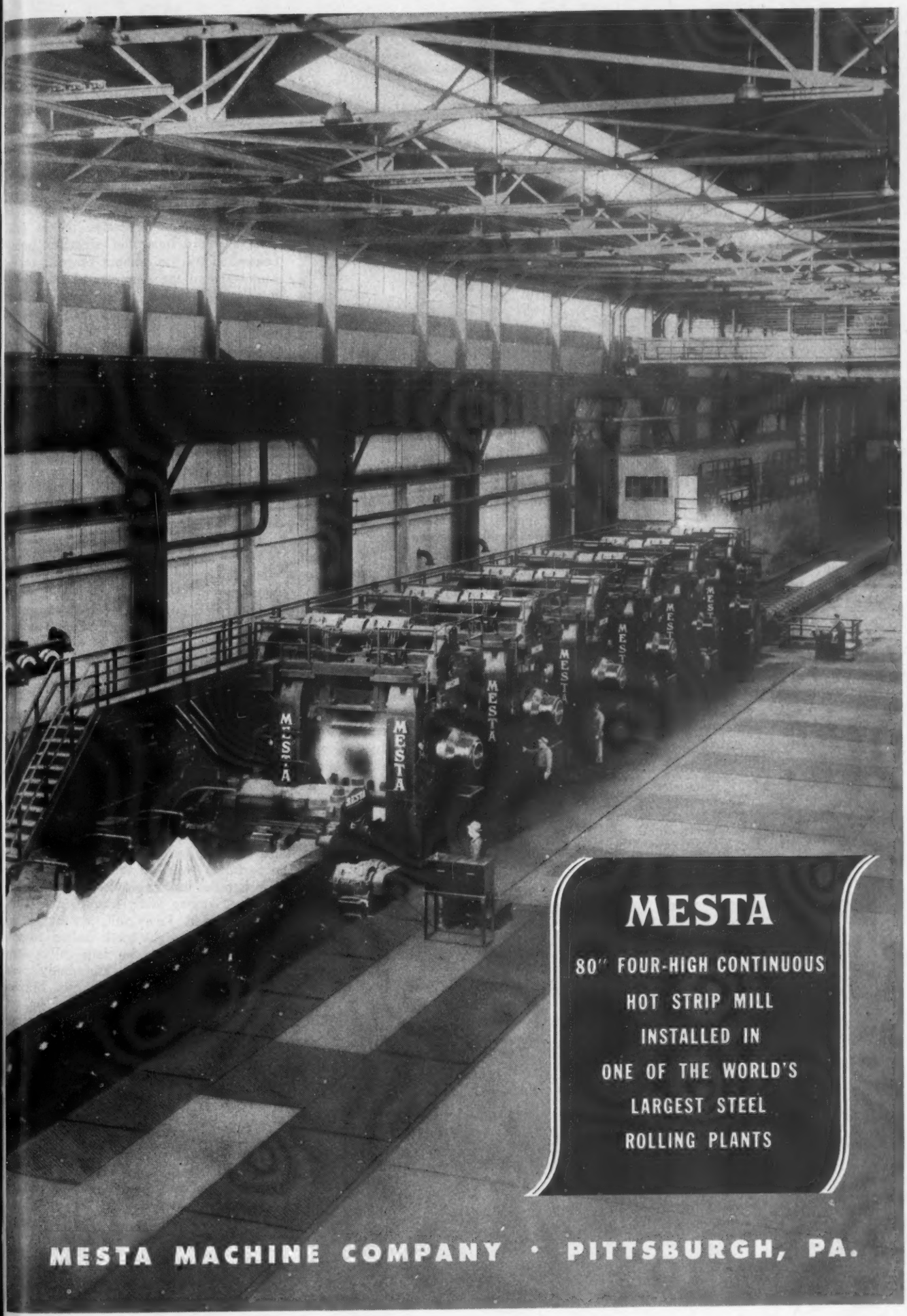
Fig. 3—Forging at Gardner-Denver with a 6000-pound Erie steam hammer

Fig. 4—Hydraulic machine for broaching the feed nut shown in Fig. 3

Fig. 5—Milling machine finishing a drill part



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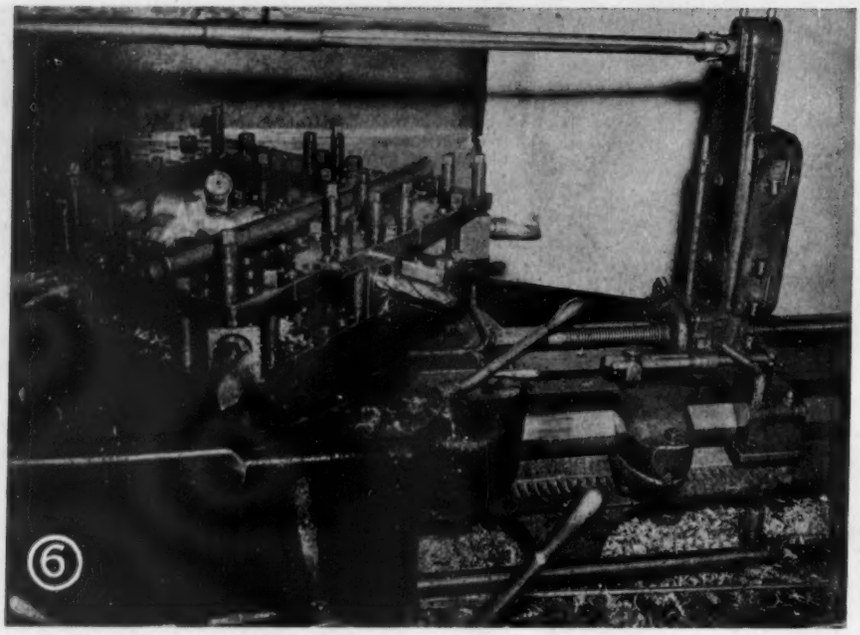


Fig. 6—Special feed attachment on J & L turret lathe

laboratories are unusually extensive.

An experimental tunnel is maintained at Idaho Springs, Colo. where all developments are tested under actual mining conditions. Huge boulders are installed in the factory experimental department to make operating drill tests. Design and development is initiated by the research engineering department, with a staff of 20. Models are passed to its standards division for line up, sequence of operations, and production routing. The blueprint specifications are then turned to the tool design department whose 10 designers create varied tools and gages required. Finally, each new development enters the tool department to be tooled up for production.

This is good integration of purpose. The research engineering department maintains complete experimental and research facilities — lathes, mills, drill presses and is capable of reducing blueprints to model form. Complex and complete testing equipment covers air consumption, foot-pound blows, brake tests, drill speeds, and the like.

The Gardner-Denver line includes rock drills of the sinker, drifter, stopper type; muckers; hoists; drill rigs; demolition equipment; loaders—all in a variety of models for the unusual types of rock conditions. The term "rock drill" is the general designation of a machine to drill holes in rock. Contrary to the generally held impression, the drill itself does not come into contact with the rock. W. H. Leonard, chairman of the board, Gardner-Denver Co. and founder of the Denver Rock Drill Mfg. Co., venerable authority in this field, explained it thus:

"The actual drilling of the hole is accomplished by means of steel drill, one end of which is equipped with a bit and the other end with a suitable shank to be held in the drill. The shank of the drill steel is struck by the piston hammer of the drill. Each stroke drives the bit against the rock, chipping off small particles. Reciprocation of the piston hammer also turns the drill steel, the rotation set up thereby causing the cutting faces of the bit to drive against new places in the rock. The combination of hammer blow and rotation makes possible a round hole, the diameter being controlled by the amount of rock to be removed and the diameter of the dynamite to be used". Mr. Leonard has written a history of rock drill development.

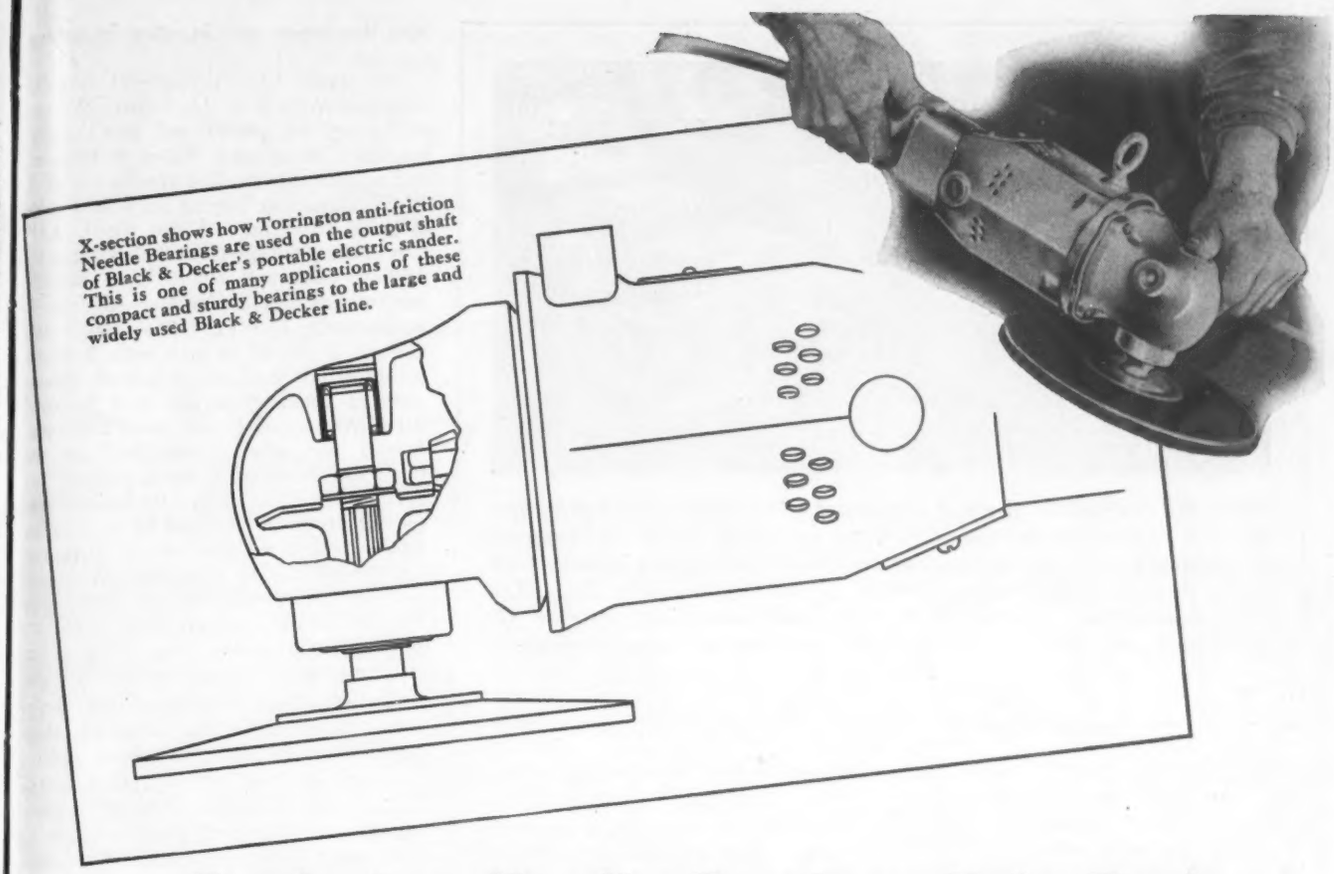
Until recent years, stoping drills (designed to drill holes pointed at angles of 45 degrees or more above horizontal) were known as "widow makers" because of the phthisis contracted. From the 1907 experience of winning a competitive $5000 award from the South African mining industry for a type of stope drill to eliminate the hazard of phthisis, Gardner-Denver has been a prominent leader in rock drill design.

It developed the tappet interposed between hammer and drill steel to obviate the necessity of lug or collars in proper positioning. Following the introduction of hollow drill steel, its improvements in conveying mixed air and water to the bit end was one of its contributions to this important field. This development keeps down the dust that would otherwise be present. Also the mixture acts as a drill bit coolant and makes possible the use of high-pressure air in horizontal or down drilling.

The completely equipped tool department makes all jigs, fixtures, milling cutters and other tools except the small ones such as taps, dies and reamers which are bought outside. About the only equipment not observed in the department was a thread grinder. It also handles machine redesign and maintenance. Among many examples, a company-designed face mill, 8 inches in diameter with eight teeth bolted to the spindle for rigidity by four Allen cap screws, was noticed. The body was boiler plate with carbide tips brazed into the block and further held by set screws. The design employed a cutting bracket face, cutters at 5 degrees negative rake. It was throwing out metal like chaff from a thresher.

Another good tooling example was the feed nut for the automatic feed on the rock drill. This required five threads with a 2½-inch lead thread. The company tried unsuccessfully to get outside manufacturers to make the tap. Finally, the tool department designed a set of taps and a fixture that neatly positions the feed of the tap. The fixture may

Fig. 7—Set of gage blocks and checking gages in Denver-Gardner tool crib



X-section shows how Torrington anti-friction Needle Bearings are used on the output shaft of Black & Decker's portable electric sander. This is one of many applications of these compact and sturdy bearings to the large and widely used Black & Decker line.

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be described as a positive feed attachment that revolves the work in relation to the feed of the tap which is stationary, the work being accomplished on a hydraulic vertical push broach made by Gardner-Denver.

The centralized tool crib accommodates the entire shop, tools involving the production of the 10,000 parts customarily in process being turned in or out as the job requires and being held on the floor until the job is completed. The department foreman orders out a "set-up ticket" which provides a complete inventory of all gages and tools for that particular job. By operation, cards under sequential number show the tool, location, size, dimension, gage check. These are maintained in exhaustive files under instantaneous control.

Storage within the crib is departmentalized to tools such as drills, milling cutters, grinders, jibs and fixtures, gages, inspection. Central tool inspection in this crib has every facility such as Johannesen blocks and Bausch & Lomb optical comparators. Gages are handled as tools and stay on the job, being inspected as they are checked back in after the job is finished, or each day in case of long jobs which are held to close limits.

Milling department is completely equipped with Cincinnati 3s and 4s, Kearney & Trecker double spindles, thread millers, B & S gear cutters, Lees Bradner, Fellows gear shapers and hand mills, all individually driven.

One of the interesting jobs observed was the milling of a rifle bar, received at the job as a rough turned blank with head to be milled in one spiral milling cut, involving six spiral splines with flutes of 5 inch, ¼ to 3/16-inch deep. The rifle bar is the rotating member of the rock drill and takes the strain of 70-foot drives whenever this becomes necessary.

The work was rigged on a No. 3 Cincinnati, the table set at an angle. A multiple indexing head was employed, splining each of three pieces simultaneously. Machine speed was 130 revolutions per minute, feed 3⅝ inches per minute, three form cutters of company design being used together.

Another interesting bit of precision was boring the axle bearing holes on an under-carriage for a mine loading machine, known as the mechanical mucker. Limits were 0.001-inch and since the holes act as gear center, a center-to-center distance plus or minus 0.0025-inch was involved. This work was done on a No. 4 Cincinnati horizontal mill.

In the drilling department, radial, gun barrel, small drills and broaching machines are in some profusion, including much internal broaching. The internal drilling of eight holes in a rock drill cylinder, using a special company-designed horizontal internal drill was particularly interesting. In this rigging, the arbor holds the gearing to drive varied size drills. The arbor consists of a special drill shank with a taper and flat driver that anchors in the arbor spindle. The holes drilled internally must match the 90-degree long drilled holes on the part to within a 0.005-inch tolerance. A special positioning stop is employed. The work is located off the long drill hole. The whole operation is unusual.

Also unique was a broaching operation on a rock drill chuck broaching a rectangular slot ¾ x 2 inches started with a round hole using four broaches. In another operation on the same part the piece is placed in a fixture on a Fellows Gear Shaper and the opening is generated out to 38 degrees and 2⅜ inches deep, using a special form tool made by the company. The tool cuts into the recess put in after broaching the slot.

The turret lathe department is fully equipped with J. & L., Libby, Warner & Swasey equipment and small screw machines, including a Potter & Johnson, and a bolt cutter. The machining of a 14 ST aluminum forging for a hydraulic cylinder base, one of the many AAF jobs in the plant, involves facing, tapping, drilling, bore and counterbore, threading, recessing and beveling—this on a multispindle J. & L. The rough tap and finish thread to size with a single point carbide tool, using a lead attachment of company design on a J. & L. flat turret was observed; speed 208 revolutions per minute, and feed in the turn and bore of 0.006-inch foot per revolution. The lead attachment was geared up from the head in a 2:1 ratio to the back of the attachment. Gears can be changed in the lead attachment part to win any thread desired, even pipe thread. There is a feed screw in the attachment that pushes the hexagon turret forward. It disengages automatically.

Drilling the rock drill cylinder on a Libby turret lathe was observed, starting solid with point and face, drilling $3\frac{7}{8}$-inch up to 4 inches using a special counterbore tool. This work is on manganese molybdenum, shop work being in a great variety of metals. The shank of the counterbore is spiral and of ordinary tool steel and has a milled slot for a double and high speed tool steel cutter held in place by two hollow-head set screws. This takes the place of a tool that cost $287. It has reduced tool cost to about one-eighth.

Machining A Coil Housing

The shop's automatic screw machine setup has single and four-spindle Gridleys, Clevelands, B & S equipment with one odd Borematic setup. An interesting job on the four-spindle Gridley involved the machining of the coil housing for general controls. In first position, the outside diameter was spot drilled and formed. Second, the flat bottom hole was drilled to depth and the inside diameter was rough formed from the rear. Third, two holes were reamed in the inside diameter to 0.004-inch tolerance, cut off part way. Fourth, a 1-inch 20-thread to 0.002-inch tolerance was cut the rest of the way. The depth of the flat bottom drill was being held to 0.005-inch. The steel was B1113 free cutting screw stock. Speed 342 revolutions per minute and a 0.0046-inch feed in 0.863 seconds time.

A cylinder liner for the rock drill of high tensile bronze was being machined on the Borematic, the operation being finish, turn, bore and radius. The first station finished the bore and radius and the second finish turned all diameters and rough turned two diameters. A special G-D fixture was used to turn a 0.359-inch radius, bore and swing the radius in one setting, tolerance being

(*Please turn to Page* 174)

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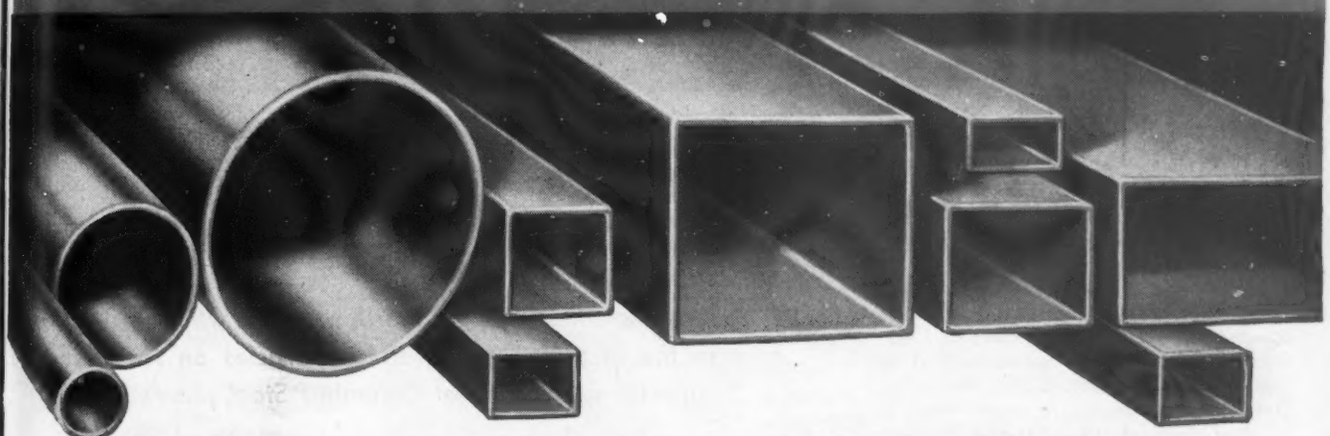
The Modern Electric Resistance Welded Steel Tube



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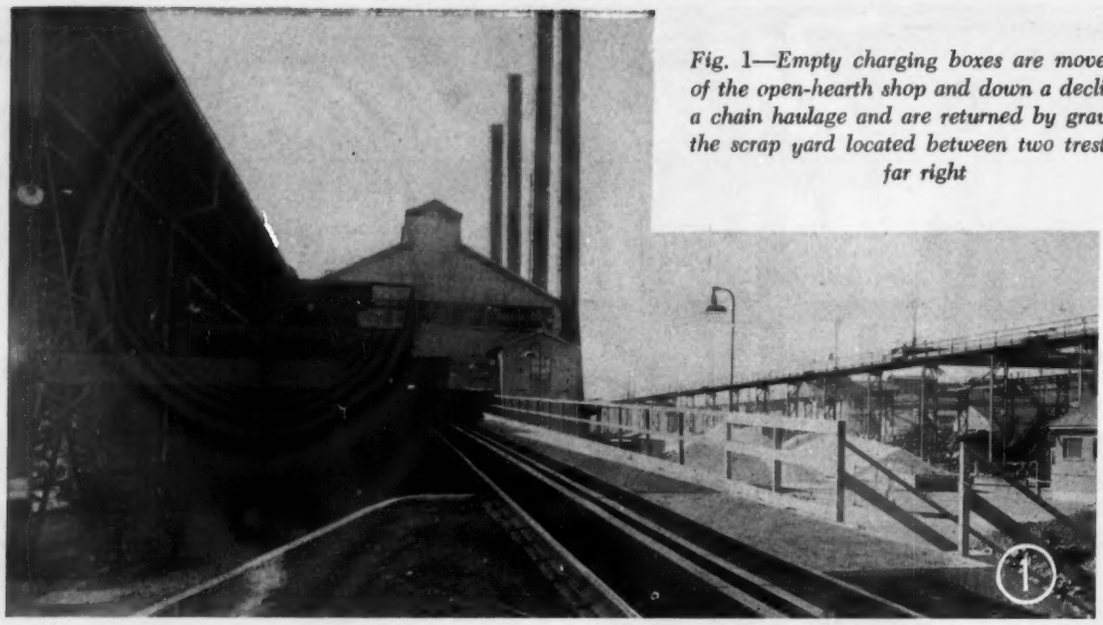


Fig. 1—Empty charging boxes are moved out of the open-hearth shop and down a decline by a chain haulage and are returned by gravity to the scrap yard located between two trestles at far right

West Coast Steel Mill

. . . . features efficient open-hearth practice, which is described here in the first of a series of four articles on facilities and operating practice at Columbia Steel plants

By G. ELDRIDGE STEDMAN

IN NOVEMBER, 1910, a venturesome group of pioneers watched California's first heat of open-hearth steel being poured at Pittsburg, 45 miles from San Francisco. A rapid increase in steel demand for expanding lumber, shipping and gold dredging industries accelerated these early beginnings of Columbia Steel Co., and in 1930 it joined the family of U. S. Steel subsidiaries. The company is completely integrated, having coal and iron mines in Utah, blast furnaces and by-product coke ovens at Provo, Utah, and steel mills at Torrance and Pittsburg, Calif.

W. A. Ross, president, has spent his entire business life in the steel industry, starting as an office boy. He is optimistic as to West Coast possibilities for the next decade—of which, said he, the U. S. Steel Corp. is fully cognizant.

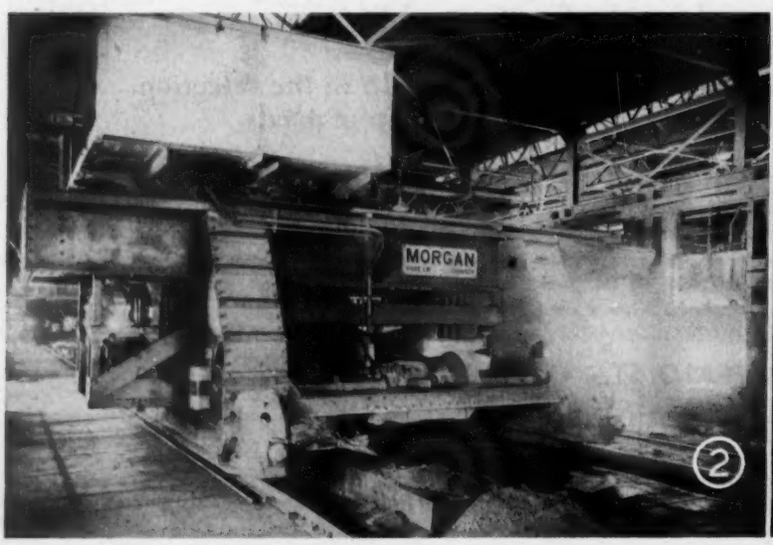
The entire operation is under the direction of Joseph A. White, general superintendent, who joined Columbia in 1940 upon his return from England, where he had been associated with Richard Thomas & Co.

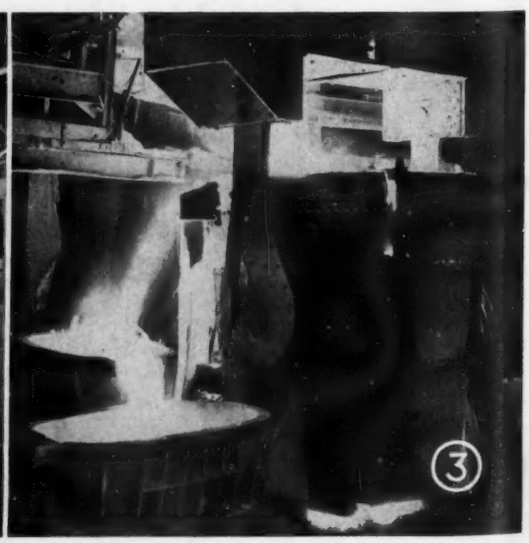
From a general standpoint, all Pittsburg operations, covering some 400 acres, are distinctive for the excellence of their straight line production, standard practices and control, and for the well-conceived production scheduling program which has helped to minimize the acute labor shortage.

Iron comes from one of Columbia's Provo, Utah, blast furnaces. This stack produces nearly 600 net tons of pig iron each 24 hours using approximately 1000 tons of iron ore, 200 tons of limestone,

Fig. 2—Charging machine for manipulating charging boxes in and out of open-hearth furnaces

Fig. 3—Tapping steel from an 80-ton open-hearth furnace into ladle resting on its standards. Slag is shown at the left overflowing into ladles of "bathtub" type





Where the Call is for Piping Materials ....CALL ON CRANE

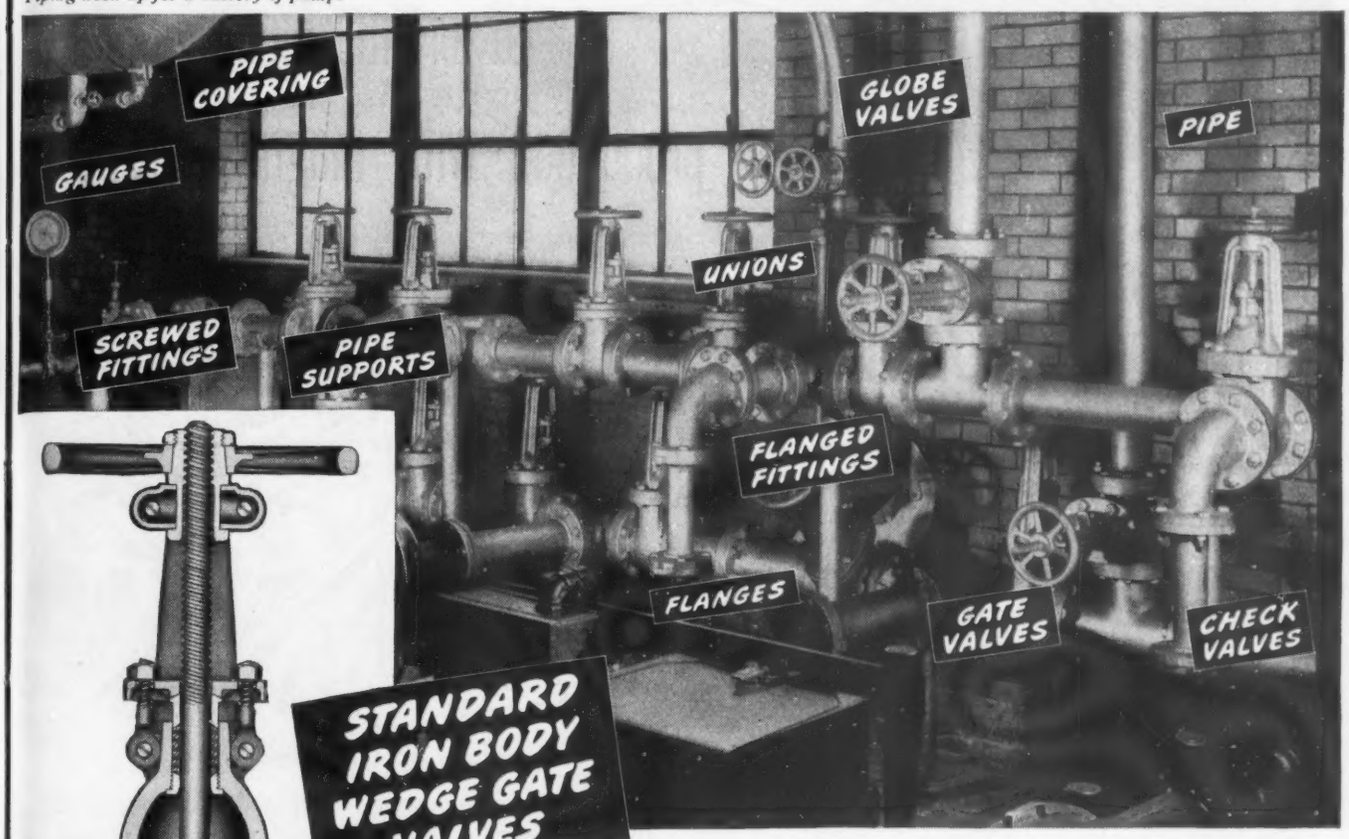
ONE SOURCE OF SUPPLY

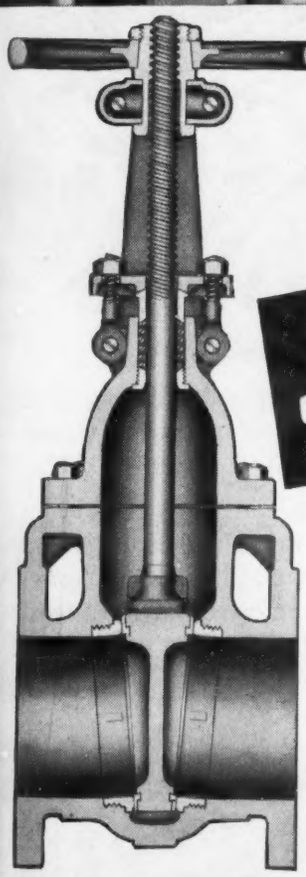
ONE RESPONSIBILITY FOR ALL PARTS

ONE STANDARD OF QUALITY

No matter what you need in piping materials, you can get them *all* from a single source—your Crane Branch or Wholesaler. There, the world's greatest selection of piping materials —in brass, iron and steel—is at your service. Uniform quality in every part—backed by a single responsibility—helps assure the best installation. Take advantage of Crane *complete* piping materials service to speed up deferred replacement work and keep pipe lines at peak efficiency. Crane has everything you need; for example, in Standard Iron Body Wedge Gate Valves, as shown below.

Piping hook-up for a battery of pumps





STANDARD IRON BODY WEDGE GATE VALVES

SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** with Brass trim are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O. S. & Y. and Non-Rising Stem patterns.

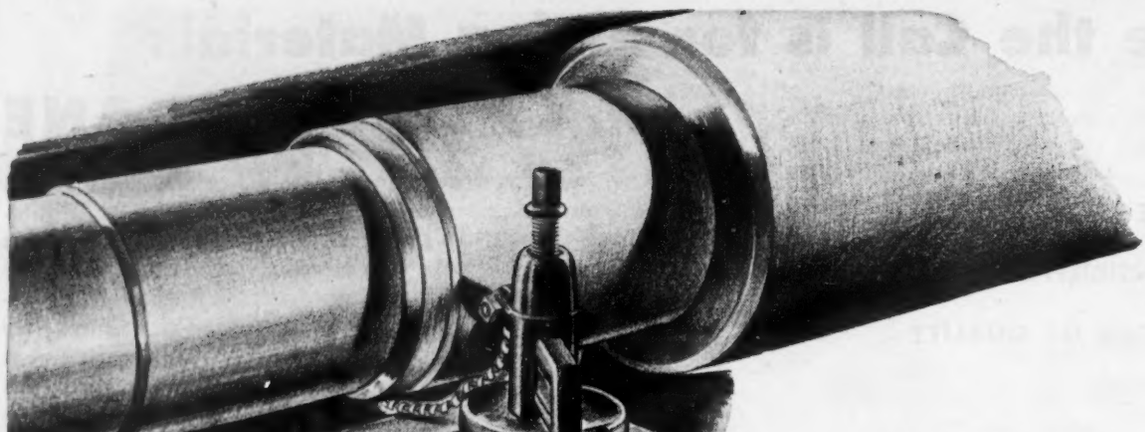
Working Pressures

Size of Valve	Screwed or Flanged Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil, or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-inch, Crane 150-pound Cast Steel Gate Valves are recommended.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE 90 YEARS OF PROGRESS 1855 1945 **VALVES • FITTINGS • PIPE**
PLUMBING • HEATING • PUMPS



Lower machining costs—
speed production with magnesium alloys

Dow engineers . . . backed by unmatched experience are ready to work with you

You know magnesium can save you weight . . . *but just wait till you start to machine it!* That's when you meet another big magnesium economy factor —the savings in time and power and tools.

Magnesium alloys can be machined at exceptionally high speeds—often at the top speeds of modern machine tools. Heavier depths of cut and higher rates of feed are also standard magnesium practice. And when you remove a given amount of magnesium, you use noticeably less power than for other common structural metals.

Tool life is considerably extended when you turn to magnesium, especially if you use carbide tipped tools . . . another saving!

Dow has spent more than a quarter century in magnesium development work, and maintains a trained staff always seeking still more improvements. These technicians are on call to work with you. For consultation, simply contact the nearest Dow office.

DOWMETAL

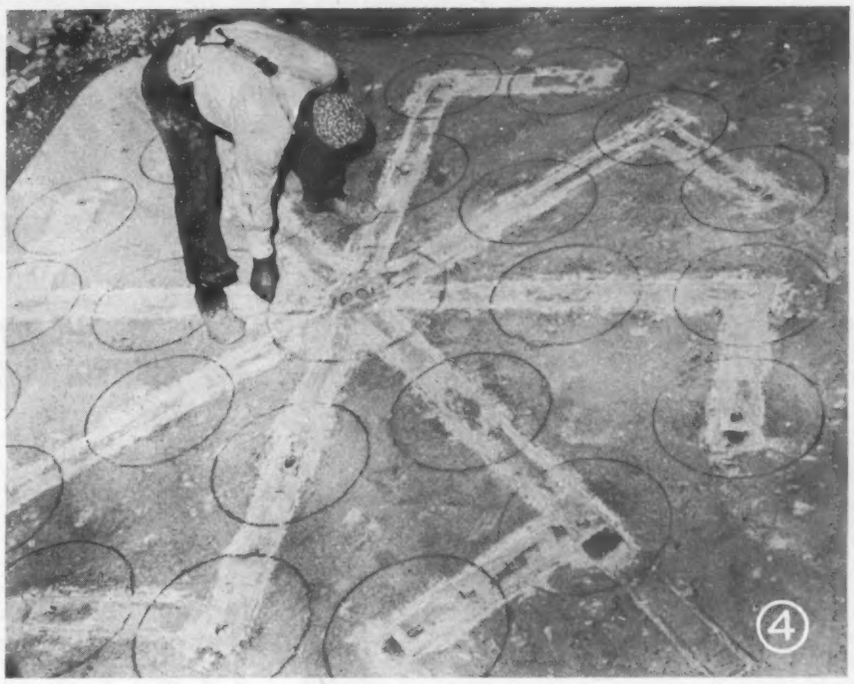
magnesium

THE METAL OF MOTION

MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

Fig. 4—Plate being marked to aid in spotting ingot molds to be bottom-poured. Master mold into which metal is top-poured is placed over center area being marked. Metal flows through channels beneath bottom plate and up into 24 molds simultaneously



460 tons of coke and 47,000,000 cubic feet of hot blast per day. Many different grades of foundry and basic iron are made. Basic pig iron for open-hearth use is shipped by rail to both Pittsburg and Torrance plants.

The south end of the open-hearth building at the Pittsburg Works looks out to the foothills with Mt. Diablo in the distance; its north end views the headwaters of Suisan Bay which empties into San Pablo. From here the big boats can be seen going to Stockton and Sacramento. E. C. Kain (with Columbia since 1941 and previously with U. S. Steel since 1912, coming from Birmingham, Ala.) is superintendent of the open-hearth shop.

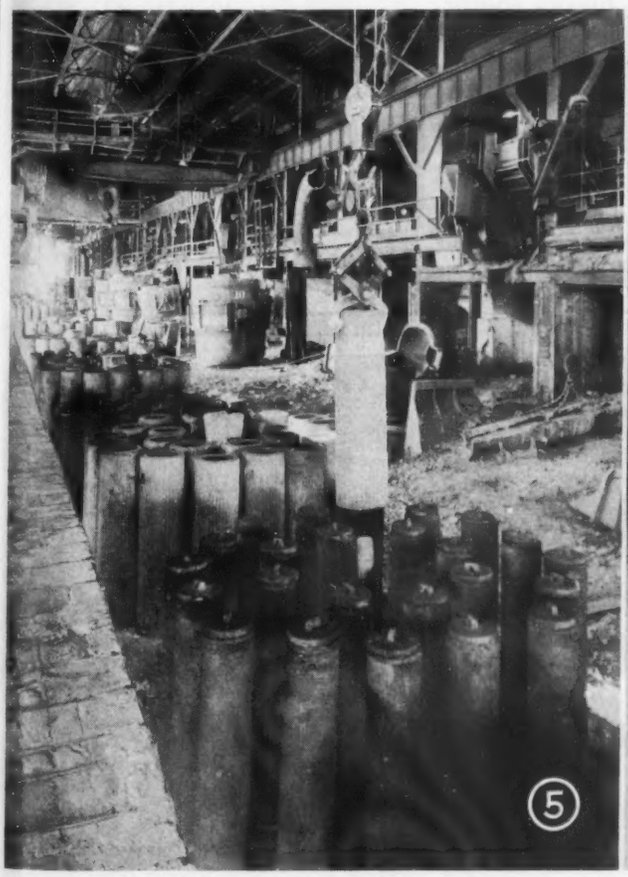
Storage of raw materials is efficiently arranged. The scrap yard is 1200 feet long by 100 feet wide, divided into 30 bays of 40 feet each, and serviced by two overhead electric cranes. A tandem bin system provides a 15 to 60-day storage supply in that while one is being emptied, the other bin is being filled.

Scrap and pig iron for the open-hearth furnaces are loaded in boxes placed four on a charging buggy. Diesel locomotives, on standard-gage tracks, deliver these buggies from the south end of the yard to the open-hearth floor. An electric charging machine empties the material on the hearth of the furnace and then replaces the boxes on the cars. Six cars at a time are conveyed by a chain haulage from the north end of the charging floor to the bottom of the incline where they are released to travel by gravity around a circular track to the scrap yard.

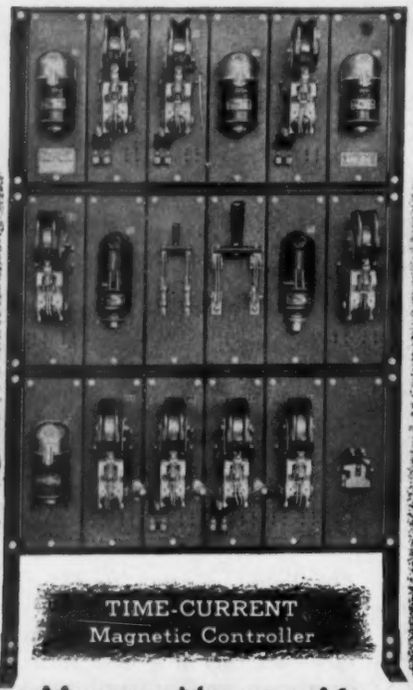
When the charging cars are placed against the stop of the continuous operating chain haulage at the top of the

Fig. 5—Molds are removed from their ingots by a stripper crane and special tongs and placed on bottom plate ready for next heat

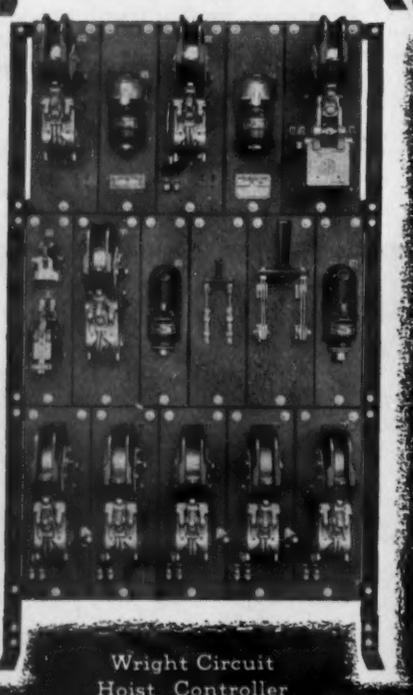
Fig. 6—Cluster of 24 molds in foreground has just been poured with low-carbon rimming steel



Good Cranes



TIME-CURRENT
Magnetic Controller



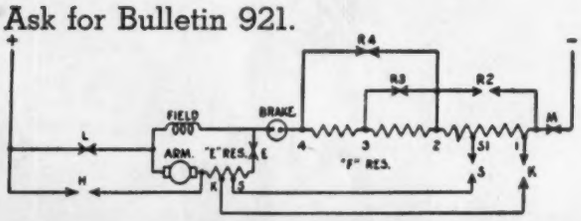
Wright Circuit
Hoist Controller

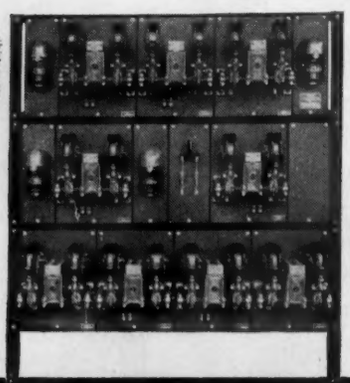
THE WRIGHT DYNAMIC LOWERING CIRCUIT CONTROLLER FOR D.C. CRANE-HOISTS

This is unlike any other Crane-Hoist Controller in that all the current taken on the first point lowering goes through the brake coil. An exclusive feature, it is clearly shown in the connection diagram below and results in the following important advantages:

1. The brake, because not in a divided circuit, releases instantly and requires only full load current from the line to obtain this quick response.
2. Current peaks, handled by both motor and controller, are consequently reduced.
3. There is less contactor wear due to lower current used and to the fewer movements required when spotting heavy loads.
4. Fast brake release permits extreme accuracy in setting loads.

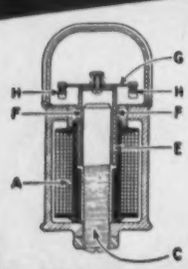
Ask for Bulletin 921.





DUPLEX Control for 2-motor-drives

Insures each motor assumes its share of the load — no unbalanced condition to cause mechanical strain or uneven distribution of power taken by either motor. Also made for 4-motor-drives.



TIME-CURRENT Relay

Consists of a series-wound coil, A, with a simple metallic sleeve, E, carrying the contacts. An adjustable steel core, C, threaded into the case permits quick, simple method of adjustment.

THE ELECTRIC

2698 EAST 79TH STREET

Deserve Good Equipment

THE TIME-CURRENT MAGNETIC CONTROLLER FOR BRIDGE AND TROLLEY MOTIONS

An instantly responsive method for controlling acceleration according to the load. It gives fast acceleration on no-load—an important advantage in permitting the operator to take the "swing" out of the load. This unit automatically increases the time-interval per step as the load increases, allowing the motor more time to get under way and giving smooth operation. Under abnormal conditions, it forces the acceleration until the motor starts or is disconnected from the line by tripping of the overload relay.

Ask for Bulletin 921.

A STANDARD OF VALUE

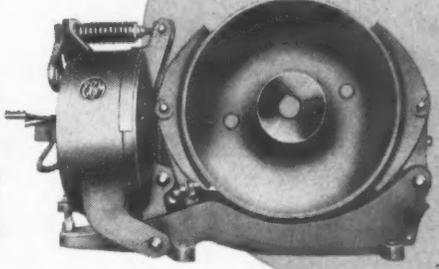
For many years, EC&M has led in the development of extremely sturdy, highly efficient electrical equipment for cranes, putting into it that extra margin of safety and quality which insures uninterrupted service to the user. The symbol, EC&M, has come to be regarded as a standard of value—as its own guarantee.

FEATHER TOUCH Control

EC&M Master Switches are noted for their easy operation which lessens fatigue and allows *quick response* to motor-driven machines. Narrow width allows several to be lined up side by side—and *all easy to reach*.

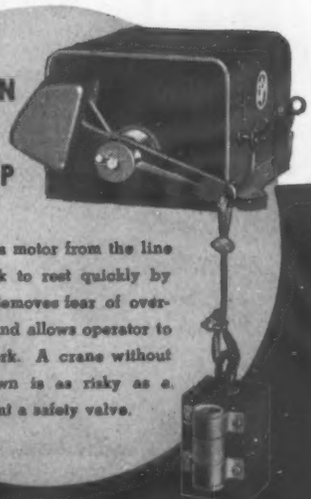
TYPE WB BRAKE for HOIST

Radically different from any other brake in that no levers, rods, or other parts of the brake pass over the top of the brake wheel. Thick molded brake blocks permit 1/4" to 1/8" wear before reblocking is necessary. Convenient hand-release for emergency operation, changing armatures, shoes, etc.



●EC&M builds a complete line of similar control for a.c. cranes and also control for floor-operated cranes.

YOUNGSTOWN SAFETY LIMIT STOP



Not only disconnects motor from the line but brings the hook to rest quickly by dynamic braking. Removes fear of over-hoisting accidents and allows operator to do better work. A crane without a Youngstown is as risky as a boiler without a safety valve.

E&M

CONTROLLER & MFG. CO.

CLEVELAND 4, OHIO

decline, the charging machine operator presses a button which starts the conveyor by photoelectric cell. They are thus released to start down the incline and around the curve by gravity. A siren operates to warn the stockyard crews of the incoming cars.

Four furnaces use 100 per cent natural gas (with a heat value of 1035 B.t.u.'s per cubic foot) from the Rio Vista fields close by. They are equipped for firing with two burners at either end of the furnace. One furnace is fired with oil through a single burner at either end. The firing operation is controlled by the operator with the aid of complete instrumentation which gives a continuous record of gas and air flows, pressures and temperatures.

The maximum furnace temperature at the roof is set at 3040 degrees Fahr. and steel is tapped at an average temperature of 2950 degrees Fahr. The average time of heats from tap to tap is 10 to 10½ hours. Welded steel ladles hoisted by 125-ton cranes, transfer the ladles of steel from the furnace to the pouring station. Slag which overflows from top of the ladle into slag boxes is dumped in the open-hearth pit and later conveyed by truck to the slag dump. Round ingots, 13 inches diameter and from 60 to 70 inches long, are poured depending upon specifications and to facilitate the correct multiple required at the rolling mill. Rimmed, killed and semikilled steel is produced and about 80 per cent of the metal is bottom-poured, most of the production being rimmed steel.

Cylindrical steel molds made in the Pittsburg Works foundry are used. From 70 to 90 molds arranged in groups on bottom plates are required per heat. Each group consists of 24 to 28 molds and three groups are used for each bottom-poured heat. Top pouring also is practiced using two 1¼-inch nozzles in the ladle and pouring two ingots at once.

Practice at the Pittsburg Works is to bottom-pour from 24 to 28 ingots at one time. The heat is poured into the central master mold from which the steel flows, through hollow brick beneath the bottom plate, up into the ingot molds.

The sequence of operations in the open-hearth practice is:

The full heat, tapped at 2950 degrees Fahr., is poured into three groups of molds that are staggered between three groups of bottom plates that have been made ready for a subsequent pour.

After the steel has solidified sufficiently, the molds are stripped and placed on the adjacent bottom plates that have been prepared previously. An overhead traveling crane services the pit. Stripping is accomplished by crane and with a set of tongs that grips the mold, raises it off the ingot and places it on the adjacent plate.

Ingots remain on the plates during the stripping operation and subsequently are pulled off with a double chain suspended from the overhead crane. Six ingots at a time are transferred to the end of the pit where sprues and fins are removed by oxyacetylene.

Molds Prepared by Scraping

The stripped molds then are prepared for the next heat by scraping with a special tool made on the same radius as the inside of the mold. The molds then are cleaned with compressed air and all foreign matter removed from the bottom of the mold with a suction pipe. Next, the molds are washed with graphite and water and are marked to length for the next heat with "hot" chalk.

Caps are placed on top edges of the molds prior to pouring a heat of rimming steel. In case of high-carbon killed steel, an additional pressure head is placed on the master runner to minimize piping in the ingots.

After the steel is tapped, its rimming action is controlled by additions to the master mold of sodium fluoride and aluminum. When the pouring of the 24 to 28 molds on each bottom plate has been concluded, caps are placed on the mold tops after the steel has rimmed in from 1 to 4 inches, depending upon the grade of steel. The usual rim is about 2 inches.

When cold, the ingots are laid down and the heat number is marked on each ingot. Sprues and fins are burned off and the ingots are loaded on transfer cars. These ingot cars travel over nearly 1 mile of trackage to the rolling mill, where they are charged cold into reheating furnaces.

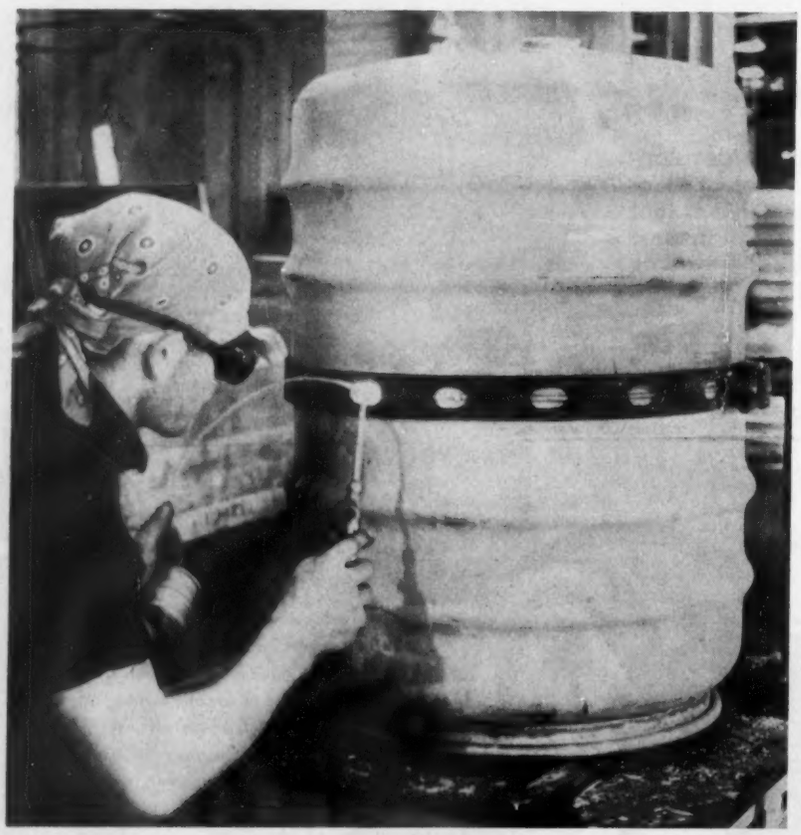
Major rebuilding, which means complete tear-down and replacing furnace roofs, usually is required after each 300 heats. Minor repairs occur each 130 to 140 heats.

Complete metallurgical control is maintained over open-hearth practice under the direction of Dr. R. B. Freeman, works metallurgist, who has a staff of some 60 technicians.

Rolling mill practice will be described in a forthcoming article.

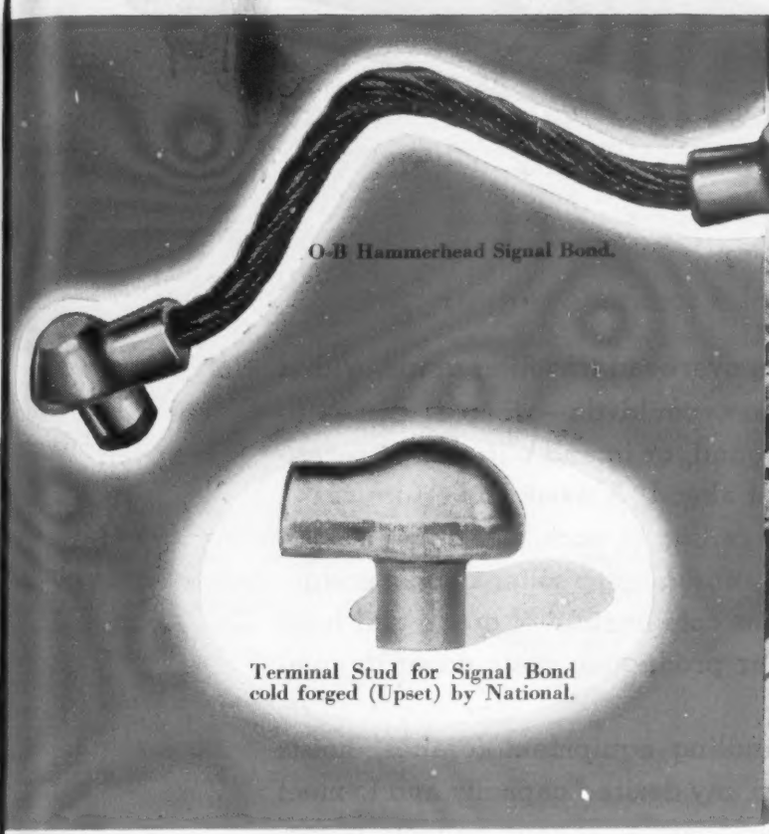
—o—

A new catalog section on all-synthetic industrial rubber gloves is available from B. F. Goodrich Co., Akron, O. It includes illustrated instructions on getting service at low cost from acid and industrial rubber gloves; methods of manufacturing by anode process, which is said to give the same advantages with all-synthetic construction as with natural rubber; and a page on the company's line of plastic treated industrial aprons.



ALUMINUM DRUM: Two halves of a 21-pound aluminum drum being manufactured by Aluminum Co. of America for use of the Air Transport Command are tack welded together before final joining by torch welding. The drums, used to supply 100-octane aviation gasoline to the American Air Force fighting in the China-Burma-India theater, weigh 31 pounds less than the old type container, making possible shipments of much larger quantities of gasoline

Can You Give Us a Tougher UPSET Job Than This?



O-B Hammerhead Signal Bond.

Terminal Stud for Signal Bond cold forged (Upset) by National.

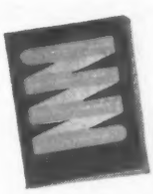
Hammer Man Driving Bond in Rail for Lifetime Service.

Here's a piece of metal that really takes a beating. It's the terminal stud for Ohio Brass Company's Hammerhead Signal Bond. It must withstand first a severe assembly operation in the plant, then a lusty blow on the head when it's driven into the rail, and finally, the constant vibration throughout the lifetime of the rail as the trains thunder over it.

When production needs for this stud could not be met by hot forging, Ohio Brass put it up to National Screw. It was a very difficult part to upset, particularly with the necessity of procuring perfect grain flow and tempering to prevent difficulties in final assembly and reforming. We worked out a method of upsetting from round wire, solving the problem of securing volume while at the same time reducing the cost.

Few upsetting jobs are as tough as this one, but we cite it to show you what unusual things can be done where unusual experience, ingenuity and facilities are at your service.

Have you seen our "Savings" booklet? If not, please write for a copy.

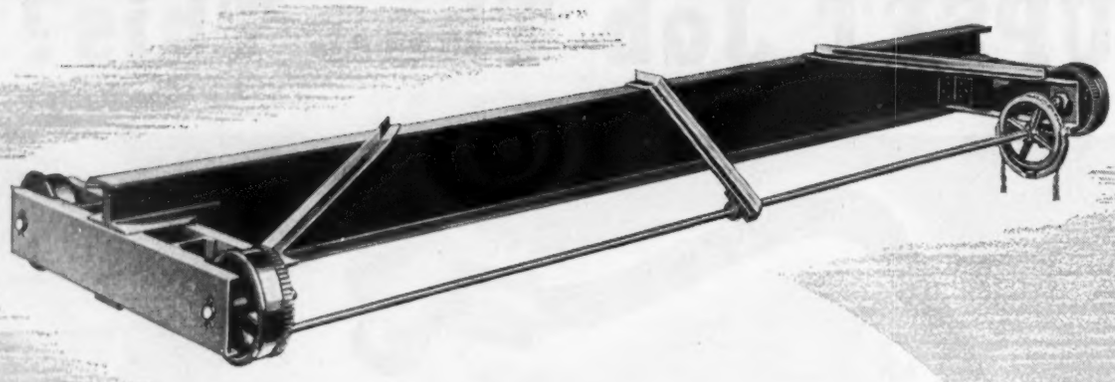


Send for a copy of the "Savings" booklet—brief diagrammatic stories of time and money saved by "National" methods.

National
HEADED AND THREADED
PRODUCTS

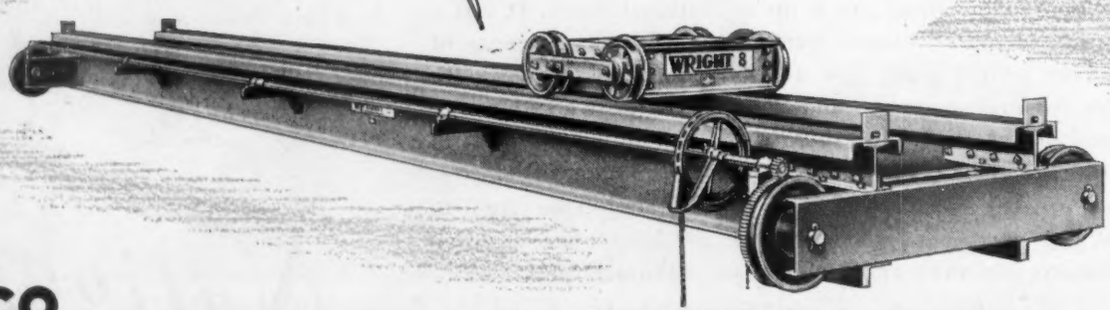
THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

WRIGHT CRANES



THINK what an overhead traveling crane, with a **WRIGHT HOIST** and **TROLLEY**, could do—when it comes to moving machinery around, or in and out, in that reconversion job that is just ahead. A **WRIGHT TRAVELING CRANE** would really put your ceiling to work, and speed up not only reconversion but subsequent civilian goods production as well. The **WRIGHT** combination of crane and hoist would help bring your production costs down to competitive levels.

WRIGHT material handling equipment (cranes, hoists and trolleys) is built in any desired capacity and to meet the most exacting specification. If your problem is special, ask local **WRIGHT** distributor (see metropolitan classified telephone directory) to call in a **WRIGHT** engineer. In the meantime, write for **WRIGHT** Specification Bulletin, or Catalog 12-D.



ACCO

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

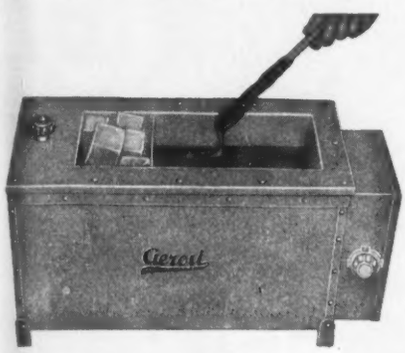
TRADE MARK

In Business for Your Safety

INDUSTRIAL EQUIPMENT

Dip Coating Tank

For heating and melting plastic skin coatings, Aeroil Burner Co., West New York, N. J., has designed a small tool room model hot dip tank. Known as Plasto-O-Dip model 3, it is built on the double boiler principle and is electrically heated by a 1200-watt immersion element encased in a liquid proof cover with heating coils sealed within steel blades. This element delivers heat

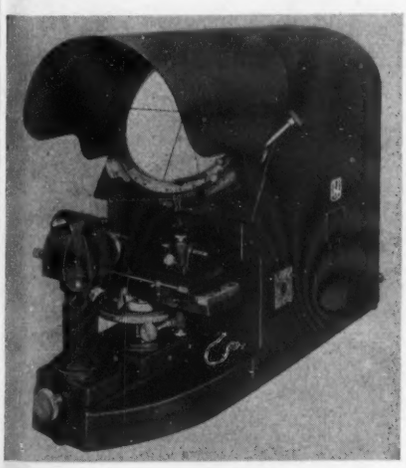


into an oil bath which completely surrounds the inner vat containing the compound. Hot oil tubes are strategically placed along the length and width of the inner vat to bring added heat from within the melting compound itself.

The temperature of this hot oil bath is controlled from 100 to 550 degrees Fahr. by a built-in housing containing a thermostat with knob dial and pilot light. A built-in dial thermometer recessed into tank wall is also provided for enacting temperature check.

Measuring Machine

A comparator with a table 16 inches long to permit measurements of lead and spacing up to 2 inches to be made is offered by Jones & Lamson Machine Co., Springfield, Vt. A hand-wheel gradu-



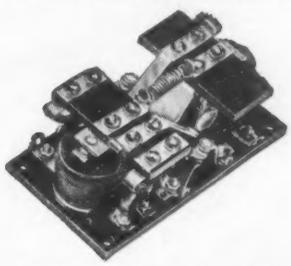
ated in 0.0001-inch operates on a hardened and ground thread spindle for making vertical measurements up to 1¾ inches. A ball thrust bearing with hardened plates is incorporated in the handwheel to eliminate friction in operation.

On one end of the table is a vernier segment with provision for compounding the table 15 degrees either side of center, for projecting hobs, worms and threads normal to their helix angle. An angle measuring attachment is provided for measuring angles in degrees and minutes.

The maximum height of the lens above the table is 3 inches and centers are available for staging objects up to 3 inches in diameter by 11 inches in length. Other fixtures which may be used with this machine include vise stage, right angle stage, 1-inch V-block and reflection attachment.

Latch-In Electrical Relays

Constructed to aviation specifications and of simplified design, the addition of series 50XBX two coil relays to their line is announced by Struthers-Dunn Inc., 1321 Arch street, Philadelphia 7. A new style positive interlock between the two

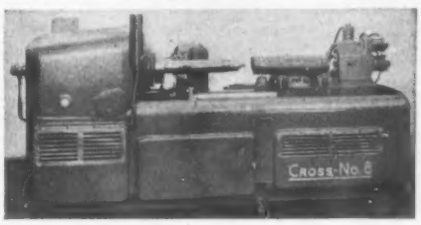


symmetrical operating elements represents latch-in relay construction in a simplified and dependable form. This latch requires no extraneous parts other than integral extensions of the coil "armatures" themselves. It operates positively from a momentary impulse and a minimum of power. Application of power to one coil latches the contacts into one position. Power then applied to the other coil throws the contacts into a latched-in second position. A third "unlatched" position, valuable for certain applications, can be obtained by energizing both coils simultaneously.

Relays of this general type are produced in ratings from 6 to 200 amperes or more and with practically any desired contact arrangement. Standard types provide for two auxiliary contacts, one in each coil circuit. The use of auxiliary contacts makes it possible to obtain operation over an extremely wide range of voltages.

Automatic Shell Cutter

For centering and cutting off shell forgings, Cross Co., Detroit, offers an automatic machine which is capable of handling forgings from 4 to 7 inches in diameter. To eliminate lifting of the work, the unit is developed so the shell rolls from the conveyor onto the loading carriage of the machine. At the push of a button, the carriage moves in the direction of the headstock and thus automatically loads the shell forging on the arbor, which then expands to grip the work in cutting position. The loading rails in the carriage are automatically lowered to clear the work while it rotates and the cutting tools feed to depth. After the cutting operation is completed and in automatic sequence, the tools are

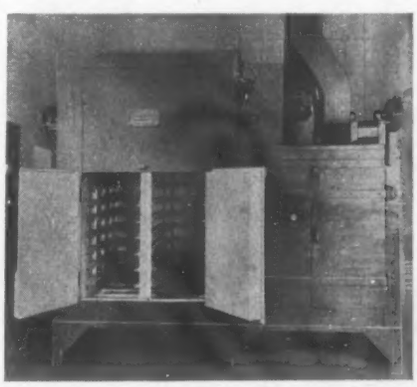


retracted, the work stops, the chuck jaws are released, the carriage loading rails are elevated and the pickup lathe removes the shell forging as the carriage is returned by power to the loading position. The shell is unloaded by rolling it out of either the back or the front of the machine, to suit the conveyor installation.

The worm driven headstock spindle is mounted on tapered roller bearings and a positive forced feed lubrication system supplies fresh oil to all moving parts. The electric control circuit is interlocked for safety and to prevent cutting tool breakage.

Box-type Oven

Industrial Oven Engineering Co., 11621 Detroit avenue, Cleveland, has developed a standard box-type oven for the high speed evaporation and drying of highly volatile solvents. It is a self-contained unit, with all heating equipment and ductwork built into the oven shell, and is shipped assembled ready to operate or in prefabricated sections



for quick assembly at the point of operation.

Door sizes range from 3 feet wide by 3 feet high to 5 feet wide by 6 feet high and working depth from 3 to 6 feet. The temperature range is from 150 to 900 degrees Fahr. with a tolerance of plus or minus 2 degrees.

The oven shown here is a standard

(All claims are those of the manufacturer of the equipment being described.)

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MIGHTY STEEL TIDE FLOWS ON THE RAILS

Transporting the many millions of tons a year of raw materials, supplies and equipment — iron ore, coal, coke, limestone, lumber, brick, sand, cement, machinery — to keep steel production at capacity, and distributing more than 60 million tons of steel products annually to the world of war and industry is a tremendous undertaking.

The railroaders by their magnificent, on-the-minute handling of millions of tons of raw materials and finished products are keeping the mighty tide of steel flowing full for the use of our fighting forces in the achievement of victory.

With the coming of peace, the railroads will once more take up their normal task of distributing for civilian use the multitude of steel products — many of them new and better — which will again bring comfort, convenience, and a fuller life for all.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

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FROM AN ORIGINAL DRAWING AND SKETCHES MADE AT J & L ALIQUIPPA WORKS BY ORISON MACPHERSON

RAILROADS

To wait 3 months for a freight to pass, running at 30 miles an hour, is what you would have to do at any grade crossing if all the freight cars serving the nation's steel industry during 1944 were hooked up into one single freight train on that particular railroad. And, if you tried to count the cars in the train, you would be all worn out weeks before the little red caboose behind the 6½ million freight cars came in sight.

Chow train 3,000 miles long—extending from Los Angeles to New York — would represent food transportation job done for Army and Navy last year by American railroads—nearly 11 million tons of food, 364,000 cars.

Snowy mountains, steamy jungles are among transportation obstacles being overcome by Army's railroad men in uniform. Military Railway Branch of Transportation Corps delivers the goods—and men—where and when they are needed—often under fire.

One mile of boiler tubing is the surprising total contained by average road locomotive in service on U. S. railroads. This type of tubing is one of the products of J&L's tube mills at Aliquippa and Oil City, Pa.

More than 40,000 trains, freight and passenger, operate daily throughout U. S.

"Stop trains with wind? Ridiculous idea!" was scornful greeting George Westinghouse, Pittsburgh inventor in his early twenties, encountered from railroad men when he sought favorable attention for his crude automatic air-brake (Patented Apr. 13, 1869).

First railroad tunnel in United States was bored 900 feet through crest of Allegheny Mountain at Portage, Pa., more than 100 years ago for canal boats plying by rail and water between Philadelphia and Pittsburgh.

"Hook-headed" spike used today by railroads to fasten steel rails to cross ties was originally designed about 1830 by Robert L. Stevens, then President of Camden and South Amboy Railroad in New Jersey. Stevens at same time designed the "T" type rail used today by railroads all over world.

Ibex, Colorado, on the Denver & Rio Grande Western Railroad, is highest point reached by standard steam railroad in this country, 11,522 feet above sea level.

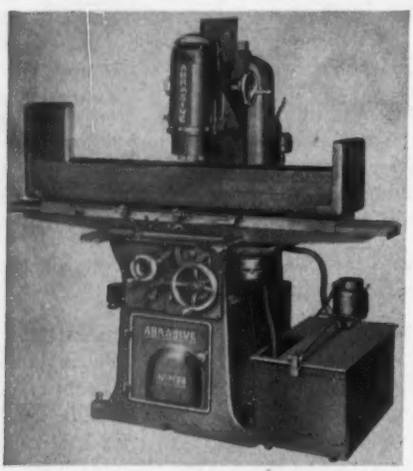
Prolonging life of railroad ties are countless J&L-made "tie-plates"; steel plates installed between rails and ties to provide a firm foundation for rails and prevent cutting of ties under heavy impact of trains.

Red Indians, not red points, were the great problem when famous scout William F. Cody signed contract to supply buffalo meat to Union Pacific Railroad construction workers, thus acquiring his title of "Buffalo Bill."

size (4 x 5-foot door and 4-foot depth) with a preheating zone added. It is used to dry fabricated paper parts which have been dipped in a finishing solution. These ovens can be used for alcohol, acetone, naphthas, methyl-ethyl-ketone and other highly volatile solvents and can be converted for other types of drying, finishing, heat treating or heat processing where materials can be handled in trays, jigs or baskets. It is suited to dense loads where air stream resistance is high. Completely automatic controls of the expansion recording thermometer type or the millivoltmeter type, either air or electrically operated, are supplied to suit the user.

Surface Grinder

Abrasive Machine Tool Co., East Providence, R. I., announces a new vertical spindle surface grinder, No. M34. The design of this machine incorporates a powerful motorized grinding spindle



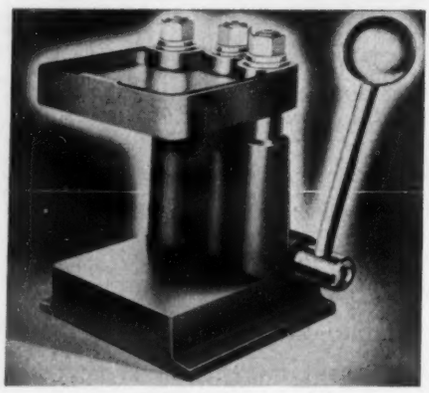
with a segment type of wheel for removing stock and securing a high grade finish. More power at the cutting point, minimized vibration and freedom from gearing and belting troubles are features of the new grinder. Transmission case is a complete drive unit, detachable from machine. Two speeds are available, and a built-in hydraulic shock absorber eliminates shock of table reversal.

Clamping Jig

Designated as Cone-Lok, a new clamping jig is announced by N. A. Woodworth Co., Detroit. The jig is constructed to utilize the braking power of perfectly mated male and female cones. It has a minimum of wearing parts and may be quickly assembled or dismantled. Massive and amply proportioned parts of the jig provide strength and a large margin of safety over any load. It can be converted from right to left hand operation in 2 minutes, using no additional parts.

All moving parts operate in an oil bath. It is so designed that chips and cutting oils are kept from contact with any of the internal parts. No movement of working parts is possible without action of the operating lever. The tray is positively clamped at any location in up or down strokes and any sudden weight or pressure applied to the tray instantly throws the second jig into action thus securing the tray at the original position.

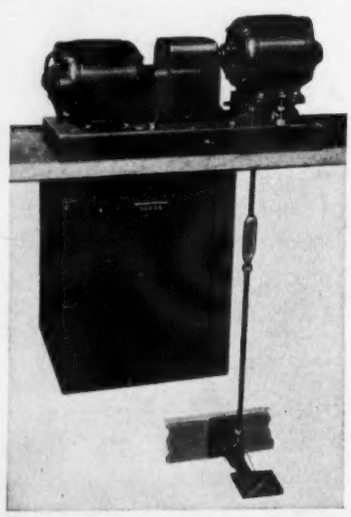
Three styles are being manufactured at present: Three-post type for most ap-



plications found in general machine shop work; the up-clamp type for use where depth of counterbore or drilled holes must be held to close tolerances; and bridge type which is necessary wherever large heavy operations must be performed such as on manifolds, cylinder heads, etc.

Wire Stripper

A wire stripper for cleaning cotton and enamel silk and enamel, string asbestos and similar types of light insulation is announced by Ideal Commutator Dresser Co., 1921 Park avenue, Sycamore, Ill. Round, flat or rectangular wire, solid or stranded, any length may



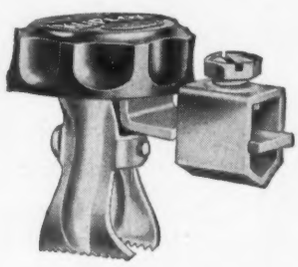
be stripped. The two wire cleaning brushes are positively driven, being mounted directly on the end of separate motor shafts. The right hand motor is mounted on a pivoted base and is normally held up by a spring. This keeps the brushes apart, except when stripping wire.

To strip wire, the wire is inserted in the opening and the foot pedal depressed. This brings the upper brush down against the wire and the lower brush—between the two rapidly turning brushes the wire is quickly cleaned. Where desirable, the distance between the brushes may be set to the diameter of the wire. The brushes are made in sections of special steel wire ground to size.

The strippings, dust and dirt are removed by a dust collector. This is driven by a separate motor, has a dust capacity of 1 cubic foot per minute and is rated at 60 cubic feet of air per minute at a 0.55-inch static pressure.

Electrical Test Clamps

A new test clamp line with jack-screw gripping action designed for making heavy duty temporary connections; motor and meter testing, jumpers, cable and bus-bar taps, battery charging, welding and other shop and laboratory



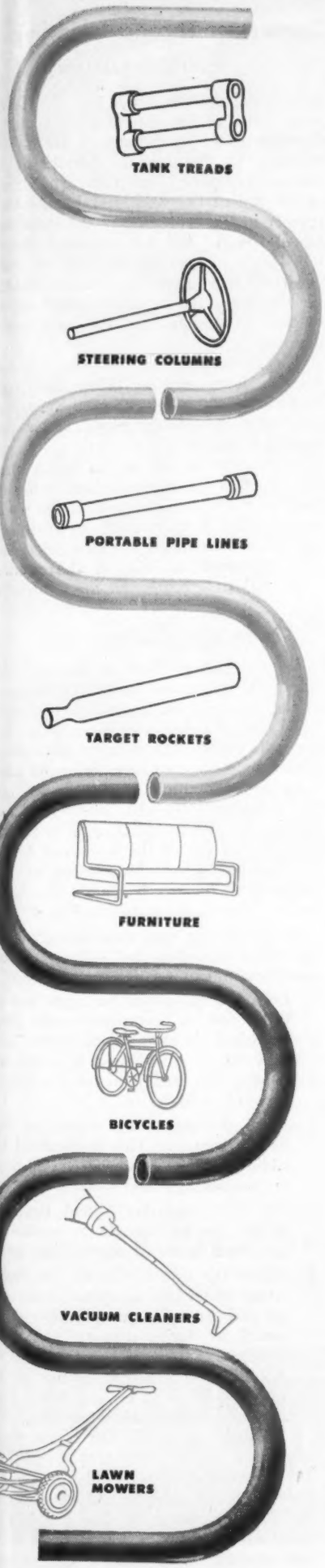
purposes is offered by Trico Fuse Mfg. Co., 2948 North Fifth street, Milwaukee 12.

A slight twist of the finger tip safety knob exerts pressure, supplying large carrying capacity of 20 to 350 amperes on constant and intermittent duty. Solderless lugs provide quick electrical connections without the use of special tools or cutting into wire; arranged to swivel around clamp, permitting wires and cables to hang in a natural position after installation. It is available in six sizes to fit across ferrule and knife blade fuse clips, switch blades, round or flat busbars, cables, etc.

Assembly Tables

New tables for assembly work and other purposes are offered by Unistrut Corp., Wayne, Mich. They can be made any length, width or height. The table legs can be placed on any center to permit spacing suitable for the operators.

Standard members under the table top, to which the legs are attached, provide an adjustable means of attaching the table top, which can be made of plywood in long sheets, planks or sheet metal. The angles, by which the table is attached to the floor are adjustable for height on the legs. Seat brackets can be set at any height in pairs for the convenience of the operators. Seats swing 90 degrees, permitting them to be swung under the table out of the way when not in use. Seats can be equipped with foot bars.



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SIZE AND THICKNESS CHART

TUBE DIAMETER	MAXIMUM WALL		MINIMUM WALL	
*O.D. SIZE	DECIMAL	GAUGE	DECIMAL	B.W. GAUGE
1/4"	.065"	16	.028"	22
3/8"	.065"	16	.028"	22
1/2"	.065"	16	.028"	22
5/8"	.065"	16	.028"	22
3/4"	.065"	16	.028"	22
7/8"	.065"	16	.028"	22
1"	.095"	13	.028"	22
1-1/8"	.083"	14	.028"	22
1-1/4"	.095"	13	.028"	22
1-3/8"	.095"	13	.028"	22
1-1/2"	.109"	12	.035"	22
1-5/8"	.120"	11	.035"	20
1-3/4"	.120"	11	.035"	20
1-7/8"	.120"	11	.035"	20
2"	.165"	8	.035"	20
2-1/4"	.180"	7	.035"	20
2-1/2"	.203"	6	.035"	20
2-3/4"	.203"	6	.035"	20
3"	.220"	5	.049"	20
3-1/4"	.220"	5	.049"	18
3-1/2"	.238"	4	.065"	18
3-3/4"	.238"	4	.065"	16
4"	.250"	3	.065"	16
4-1/4"	.250"	3	.065"	16
4-1/2"	.250"	3	.083"	14
5-1/2"	.134"	10	.083"	14

*Intermediate sizes within the range indicated can also be manufactured. Please consult us for sizes not listed.

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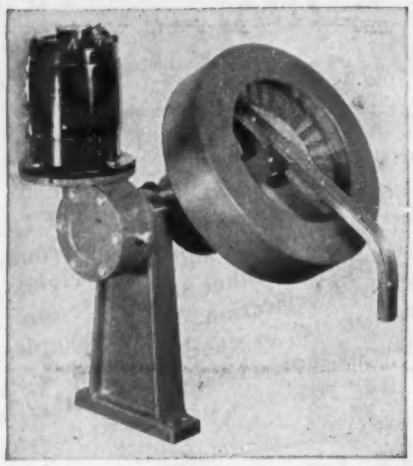
PRODUCTION EQUIPMENT

HOPPERS



Drive Screws with Hopper Feed Power Screwdrivers.

Place the assemblies in position, the machine does the rest.

Screws are all driven to a uniform tension.

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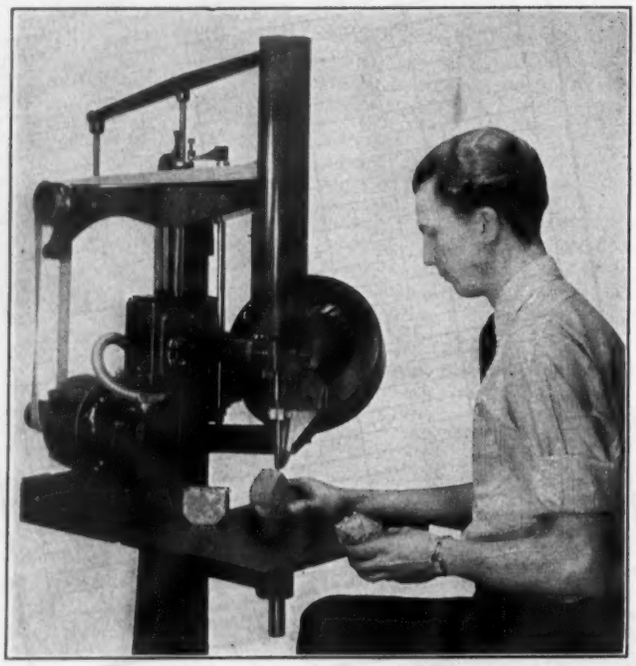

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Centerless Thread Grinding

(*Continued from Page* 104)

grinder it has been found that the helix angle must be determined for the pitch diameter to which the screws are to be ground. In this case the correct helix angle is 4 degrees 13 minutes. The slope of the top of the work rest blade with respect to the centerline of the grinding wheel spindle will be increased about 0.003-inch in a length of 5 inches, that is, 0.003-inch more than what would be the slope for the helix angle of 4 degrees 11 minutes for the basic pitch diameter.

This consideration of the change in the helix angle to grinding below the basic pitch diameter is critical in the smaller diameters, specifically those under ⅜-inch in diameter.

It may be stated at this point that once a pitch diameter has been selected such as 0.216-inch for ¼-inch 20 pitch screws, that it is possible to maintain this value consistently within a tolerance of 0.0005-inch as long as the groove form will pass inspection for a class 3 fit.

Work Rest Slopes Downward

With grinding wheel to the right of the screw and its axis horizontal, the top of the work rest blade must slope downward toward the rear of the machine at the helix angle. Likewise the regulating wheel which has no grooves on its face must assist in rolling the screw through the machine. Its axis must be tilted downward at the helix angle with respect to the top of the work rest blade so that its angle with respect to the grinding wheel axis is double the helix angle. This is illustrated in Fig. 4.

The following easy steps are given as the usual procedure for setting up the centerless thread grinder for operation:

1—Locate the height of the centerline of the screw in accordance with data furnished for each size of screw. Adjustment of this height is made by moving the wedge under the blade forward or back.

2—Dress the regulating wheel on the line of contact. This is obtained by sliding a screw blank on the stationary regulating wheel surface.

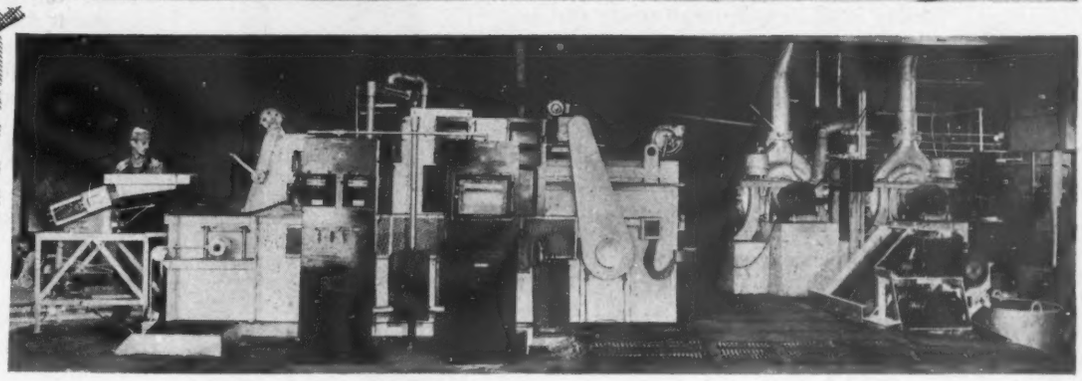
3—Tilt the regulating wheel base to double the helix angle by means of a vertical screw at rear of the base.

4—Adjust the side blades on the regulating wheel side so screw blanks enter and leave the throat between the wheel as for customary centerless grinding.

5—Adjust the side blades on the grinding wheel side as for any other centerless grinding, allowing clearance so screw blanks do not touch these blades.

The grinding wheel, which has been formed by roll crushing and by profiling the entering throat on the wheel with the diamond traverse, is brought in when not rotating, until contact against the

WHEN *Competition* REPLACES COST PLUS



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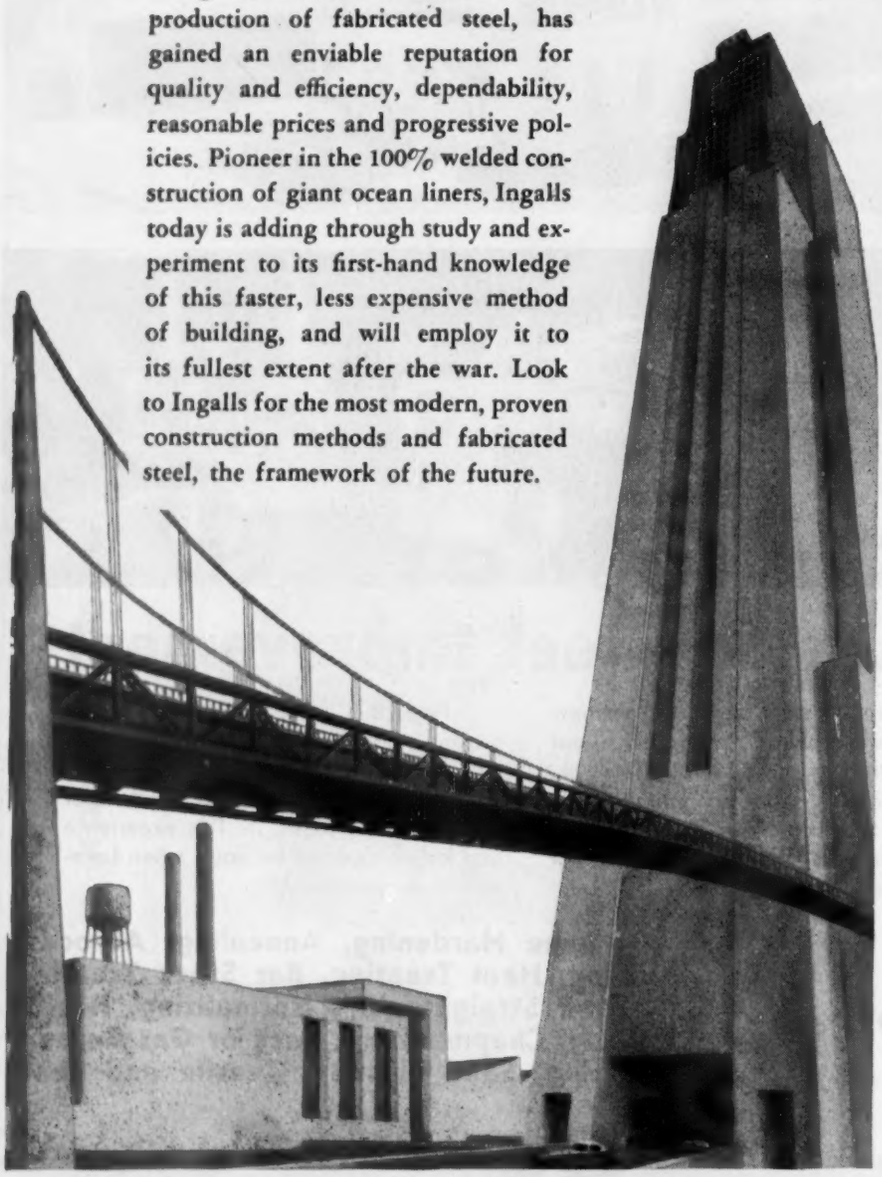

THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION, The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Washington, Pittsburgh, New Orleans. Shipyards at Pascagoula, Miss., and Decatur, Ala. Fabricating plants at Birmingham and Pittsburgh.

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screw blank makes sliding along the blade difficult. Then the graduations on the handwheel of the grinding wheel base are read to bring in the grinding wheel a distance to give required depth of grind. After one or two samples have been ground and checked, and the wheel base readjusted to give exact depth of thread, the screw blanks then may be fed to the machine either manually or by means of an automatic loader.

It was stated previously that the relationship between the major diameter of the screw being ground on the centerless thread grinder and the pitch diameter is constant. This is true if the screw blank is ground on the major diameter throughout its length while the screw thread is being formed. The reason for this constant relationship is that the outside of the screw rides on the regulating wheel and the depth of cut by the grooves in the grinding wheel is controlled by the diameter of the blank.

Relationship Is Constant

The action may be better understood by reference to Fig. 5, which shows a tapered blank with the small diameter entering the throat. Since the major diameter is not ground on the small end of the blank the grinding wheel grooves will not cut full depth, but as the large end goes through the major diameter is ground and the thread depth is complete. Therefore, the leading end of the screw will have a larger pitch diameter than the trailing end. Checking with a ring gage proves this to be so, as the leading end will not enter the gage and the trailing end will fit neatly.

Another factor which applies in this constant relationship of major diameter and pitch diameter is due to the groove form on the crusher. Except for the fact that the grooves on the crusher are annular (that is, do not form a helix) and the groove on the screw is a helix, the depth of the groove form and the width of top flat and width of bottom flat will be almost identical. As long as the grinding wheel grooves remain the same and show no signs of wear, the screw as it leaves the throat between the two wheels will be constant in major diameter and pitch diameter, providing the blank is of constant diameter to begin with or providing the major diameter is ground on the screw throughout its length.

As the wheel gradually wears away on the tops of its ridges, depth of thread will decrease slightly. When the minor diameter no longer satisfies the gage or standard desired, the wheel must be recrushed to renew its form. During grinding of many screws, action of the threads riding on the regulating wheel surface causes shallow grooves to develop in this wheel. This causes major and pitch diameters to increase. This grooving of the rubber bonded regulating wheel is very gradual and the effect can easily be nullified by moving the grinding wheel base in toward the regulating wheel two or three tenths of a

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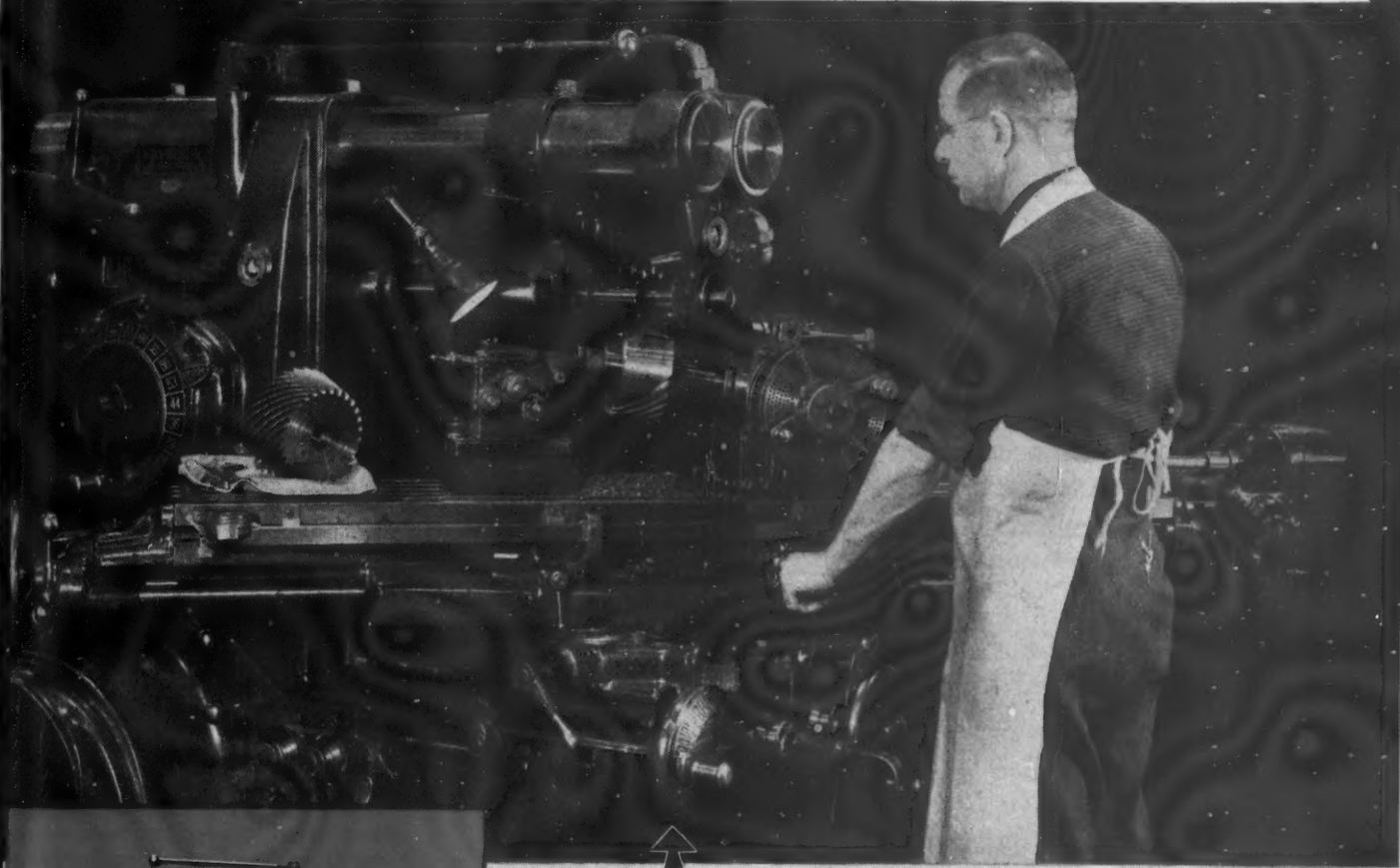

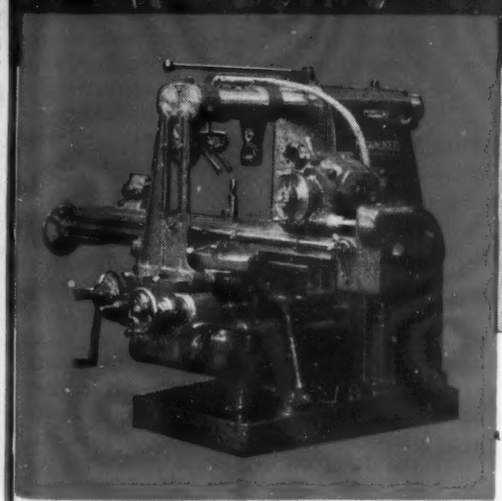

Milling Taper Reamer: in this operation a Milwaukee 3K Universal is milling the flutes in a 20° included angle taper reamer. A low lead attachment is used with a Milwaukee Model K Dividing Head and tailstock for driving, holding, and indexing the workpiece. The space between each flute is measured by less than one turn of the 5 to 1 ratio Milwaukee Dividing Head. A Milwaukee Style B Arbor employing both intermediate and outer arbor supports is used to hold the form cutter.

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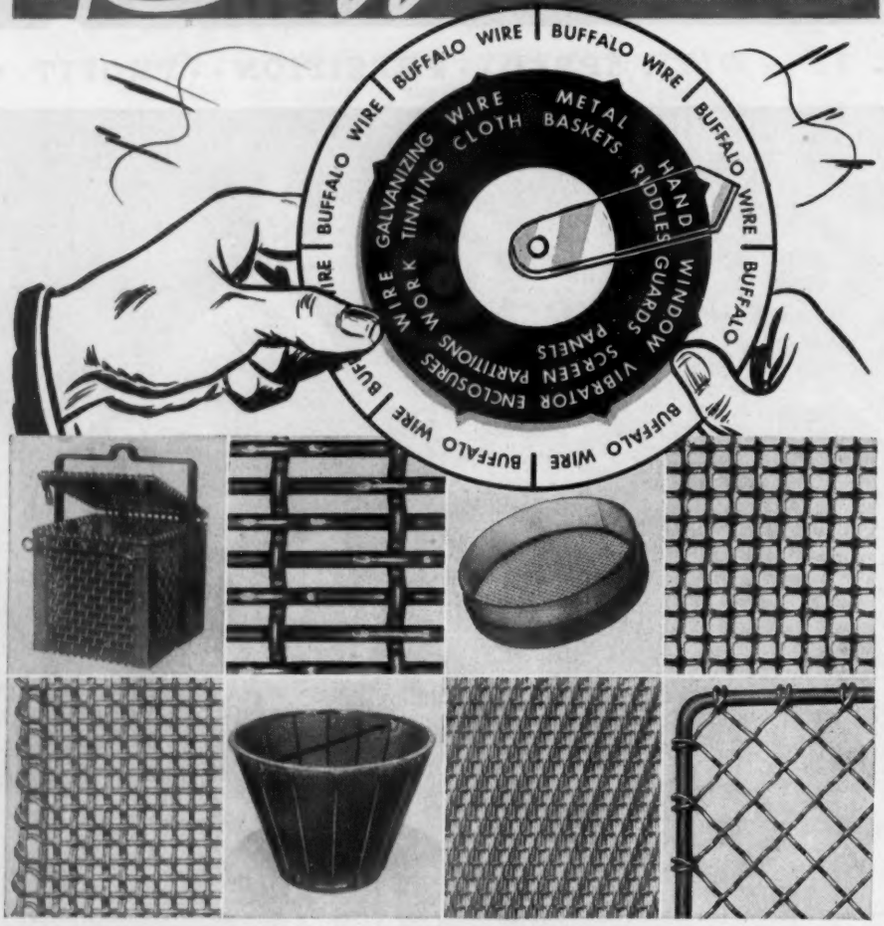
Buffalo Wire



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ESTABLISHED 1869 AS SCHEELER'S SONS

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thousandth of an inch, thus compensating for the movement of work away from grinding wheel.

When this adjustment has been made it is only necessary to check the major diameter of the screws because as already indicated they will be the same on the pitch diameter as those ground initially. When the depth of the grooves in the regulating wheel becomes too great, it should be dressed smooth again. This is necessary only about once a day, or in some cases only once in two days, of steady operation.

In grinding socket set screws, say of ¼-inch diameter with cup point, it does not matter which end enters the machine first, nor does it matter if all the blanks line up with cup point first. Therefore, an automatic loader which will feed the blanks in line into the machine permits an operator to spend his time checking an occasional screw from one or more machines.

Gages Used for Checking

Checking on a visual shadow gage or by ring gage will indicate whether the grinding wheel should be moved in a little or whether the thread form should be renewed by recrushing the wheel. As long as the screw thread form meets the requirements of the class of fit desired no change need be made. A substantial saving of screw inspection is effected and the rejections are reduced.

A loader of the vibration type (see Fig. 1) has been developed at the Landis Tool Co. This is capable of feeding ¼-inch diameter by ½-inch long screw blanks automatically as fast as 85 per minute. The operator has only to keep the hopper filled. Other types of loaders are available, are readily attached to the machine, and give satisfactory results.

During time the experimental centerless thread grinder has been in operation it has been generating threads on commercial socket set screws varying in size from No. 4—40 pitch to ⅝-inch—11 pitch, grinding these screws to finished size from hardened, solid blanks at one pass.

Figures on ¼-inch—20 pitch screws give an idea of the production volume possible. It has been found that an economical rate of grinding this size of screw is about 30 to 35 inches length per minute. This means that if the blanks are ½-inch in length, the quantity rate is 60 to 70 per minute. It has been possible in many cases to operate continuously for 8 hours without recrushing the form on the wheel. During this time from 12,000 to 16,000 screws of the ½-inch length have been ground. Checking screws while the machine operates, eliminates any further necessity of inspection.

The only difference between the first and last screws is in the minor diameter. Initially the root of the thread has a narrow width and a minor diameter is near the permissible minimum. Finally the root of the thread is broader and the minor diameter near the permissible

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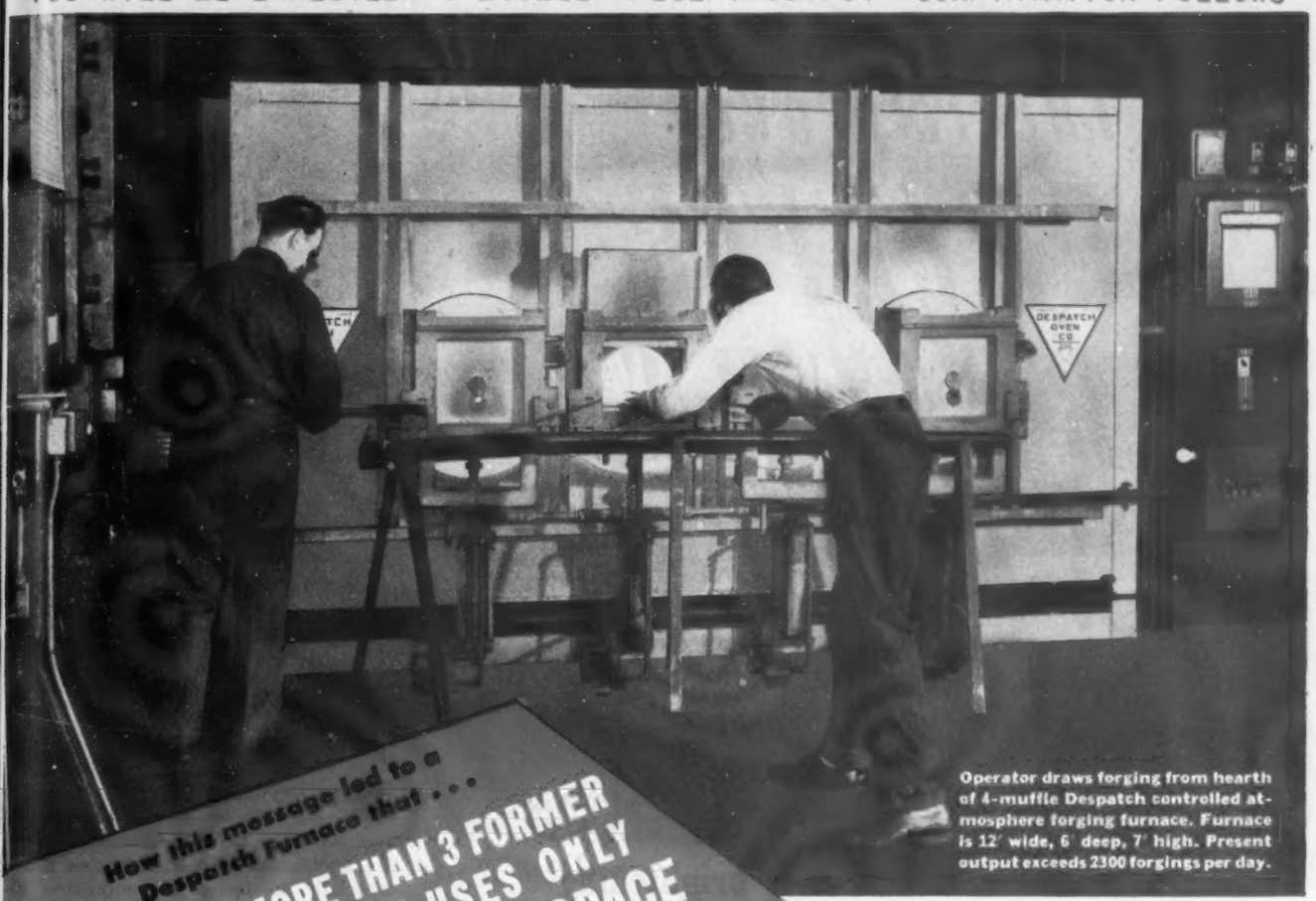

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Send Your Forging Furnace Requirements *to Despatch today! Despatch Forging Furnaces are available in all sizes, gas or oil fired.*

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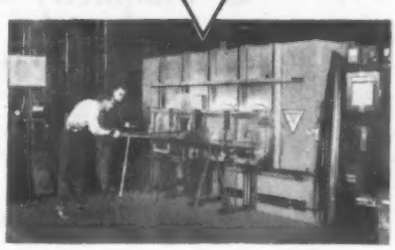

Uses Minimum Floorspace
Amazingly compact and efficient with 4-in-a-row muffle arrangement. Keeps overall dimensions to a minimum; less than 12′ wide, and 6′ deep.

Has Automatic Control
Single automatic-control system accurately maintains heat in all 4 muffles at desired level. Operates quick-response fuel and nitrogen valves. Dependable.

Increases Production
Smooth-working air-doors shoot open in a split second to allow fast removal of forgings from roomy, convenient-level hearths. Direct-to-press handling.

Assures Uniform Heating
Smooth, uniform heat through entire 36″ working depth of muffles results from ingenious Despatch system of back-towards-front firing.

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- **A fast rate of brightening**
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- **Wonderful "eye-appeal"**

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maximum. In both cases the root is rounded, since the crests of the ridges on the grinding wheel do not retain sharp edges for any length of time.

On the basis of experience, the following statements can be made for the set screws ground on the centerless thread grinder:

(a) Lead error may be as small as 0.0005-inch in one inch or less depending on the rate of production. Reduced speed through the machine reduces the error. Tests have produced results where error is 0.0001-inch per inch;

(b) In all cases where the major diameter is ground throughout the length of the screw, pitch diameter value is constant and concentric with the major diameter;

(c) Major diameter is constant throughout the length of the screw under conditions mentioned in (b), even though the blank is tapered initially;

(d) Sides of the threads are smooth and straight;

(e) Thread angles are as accurate as those of the crusher grooves, this being proved by comparator checking.

Crushing the Grinding Wheel: The formation of annular ridges on the grinding wheel by crushing is one of the features of the centerless thread grinder. This method has the following advantages: (1) it saves time; (2) crusher roll may be used several times before replacement; and (3) cost of crusher is low, especially in terms of production obtained.

Grinding wheel requirements are such that the wheel must permit of crushing. That is, either the bond holding grit particles must break down in crushing or the friable grit particles must split under crushing pressure. Probably a combination of both actions occur. Naturally, crushing action is severe on wheel as well as on the roll. However, grinding wheels are now produced which readily can be formed by crushing and which at the same time retain necessary strength of structure to maintain required groove form.

Evidence of data taken of wheel crushing indicates a shorter life of the wheel form immediately following an initial crushing from a solid wheel. In terms of the number of screws ground before renewal of the groove form is required, it has been found that initial production is only about two thousand screws.

However, following a second crushing of the wheel, involving removal of only 3 or 4 thousandths from the radius of the wheel and with less pressure necessary thus to improve the groove form, approximately 6000 may be ground before a third crushing is required. Following a third crushing of 3 or 4 thousandths again the wheel groove form will, comes production of about 12,000. Production runs of 14,000 or more have been obtained before a renewal of the wheel form has been necessary.

It is believed, therefore, that the form

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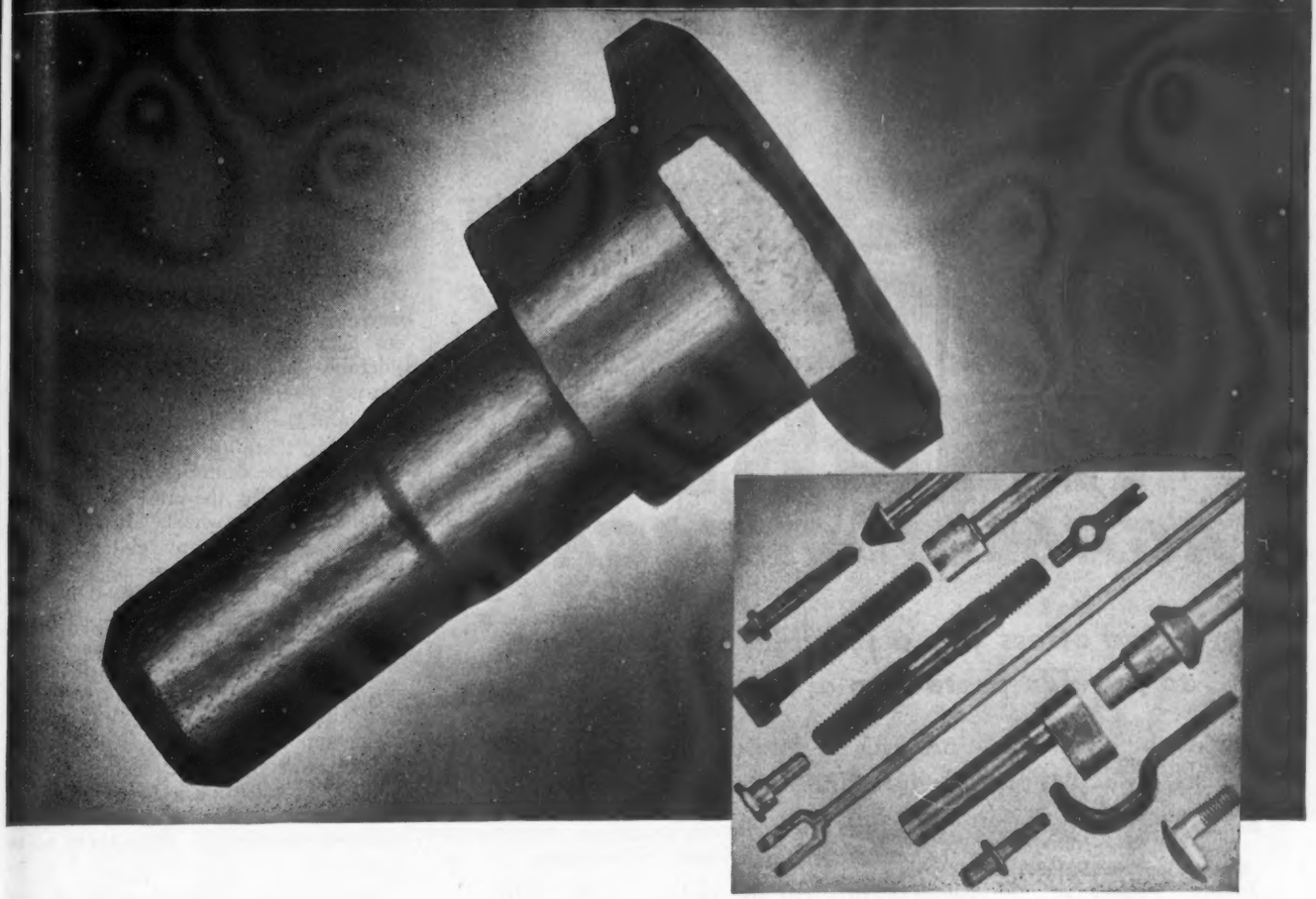

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Every one of the fasteners shown above has been *RB&W cold-forged* — and provides the *maximum* in desired qualities.

RB&W cold-forged products have maximum strength, because this cold-forging process intensifies the grain and forms unbroken flow lines in the metal. The operation of cold-forging also acts as an automatic inspection of the material — for any serious seams or imperfections in the material will immediately be opened up and revealed.

The RB&W cold-forged product has extreme accuracy and fine finish because the modern cold-forging equipment employed holds the work to close tolerances.

The RB&W cold-forged product shows *minimum manufacturing* cost because of the high speed of RB&W's equipment and because the cold-forging process virtually eliminates scrap waste.

The Longest Experience in Automatic Cold-Forging

This is RB&W's 100th year. Among the various manufacturing processes in which RB&W pioneered is automatic cold-forging. This unmatched experience—and our expanded facilities—make RB&W your logical choice for cold-forged parts. So keep both cold-forging and RB&W in mind; when war-time obligations are fulfilled, RB&W's equipment will again be available.

RB&W

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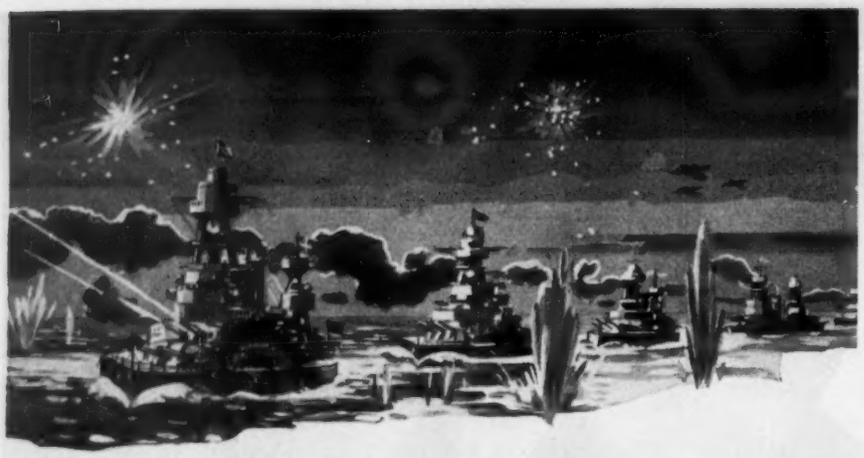

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life on the wheel varies inversely with the length of time of crushing. In other words, the longer the crushing action is applied the weaker becomes the wheel structure adjacent to the surface. This condition is particularly evident in wheels of 220 grit or finer.

Grooves on a grinding wheel for a particular pitch are seldom dressed off the face of the wheel as long as it remains on the wheel center or arbor. Therefore a grinding wheel which has been grooved should be kept on its wheel center even when removed from the machine to permit another wheel on a new center to be mounted in the machine to permit grinding of a different pitch of screw. In this way considerably greater overall production or life per wheel is possible.

Root of the Thread: It has been stated previously that the root of the threads ground on the centerless thread grinder is determined by the crest of the ridges on the grinding wheel. It is obvious that the crest for any given pitch is dependent upon the size of the grain used in the wheel. A crest, 0.004-inch wide, would be difficult to obtain with a grinding wheel having a grain size of 100, inasmuch as the average dimension through such a grain particle would be just a little less than 0.010-inch. Crushing action, as explained previously, either breaks down the bond material which holds the grain particles together or because of the friable nature of the grain particles themselves causes them to be fractured.

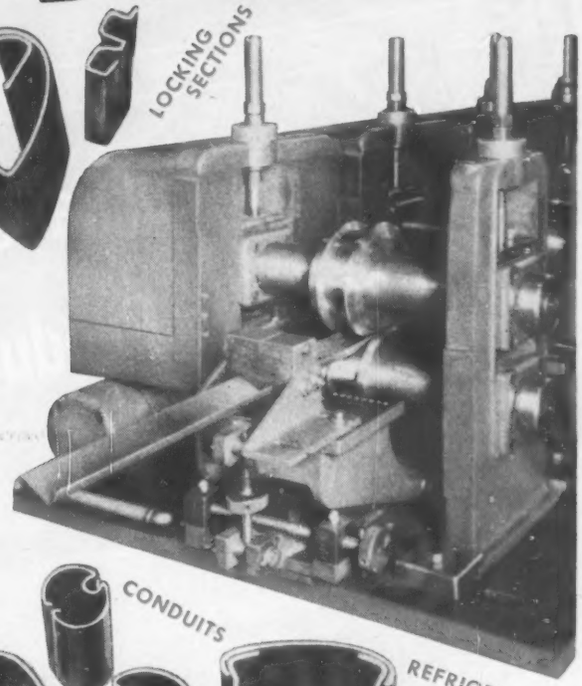
Grain size of the grinding wheel must be selected on the basis of the root of thread to be ground. The grain of any given size is determined by passing through or over a series of five mesh screens. Thus 100 grit has passed through meshes of a silk screen having 100 meshes to the linear inch (not square inch) but has failed to pass through the next smallest screen which has 120 meshes to the inch.

To enable grinding of screws having desired width at root of the thread, grain size of wheels has been considered and the following tentative table has been drawn up which provides information as to grain size recommended for various pitches.

Screw Size	Pitch	Wheel Grain Size
# 4	40	400
5	40	400
6	32	320
8	32	320
10	28	320
12	24	320
1/4"	20	220
5/16"	18	220
3/8"	16	180
1/2"	13	150
5/8"	11	150

Very soon after crushing the form of the threads ground on the centerless thread grinder will show roots with round bottoms. Particularly with the screw threads of ¼—20 pitch and smaller, does this round bottom effect become noticeable immediately after crushing.

Yoder BUILDS Machines To Cold-form These Sections



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BUY WAR BONDS

In view of the decided trend away from sharp corners of the flat at the minor diameter of the screw, results obtained from the centerless thread grinder serve to simplify production of the round bottom in certain applications where fatigue strength of the screw is involved.

Windmill Generator Unit Serves Power System

In the future the windmill will play a new role of importance, according to S. Morgan Smith Co., York, Pa., designers of a huge wind driven electrical generating station now running atop Grandpa's Knob in the mountainous areas of Rutland, Vermont. This unit drives a 1000-kilowatt generator. A transformer steps up current to a high line voltage of 44,000 volts, and electricity is fed to the transmission lines of the Central Vermont Public Service Corp.

Grandpa's Knob has fairly constant winds of good velocity. Winds adequate for driving the big blades blow about 60 per cent of the time. Thus this generating station must be tied in to a steady source of electric power, such as steam or water.

The big Vermont unit employs a two-bladed propeller having an overall diameter, from tip to tip, of 175 feet. Mechanical and structural parts, other than the blades, were fabricated by Wellman Engineering Co., Cleveland. Propeller blades have a maximum width of 16 feet, and blade pitch is changed automatically to maintain practically constant speed regardless of wind velocity. A wind speed of 18 miles per hour is insufficient to make the blades rotate at full speed. When this velocity is exceeded, the generator is connected to the system, and, as wind velocity increases, more power is generated without any change in blade pitch. At 30 miles per hour, when it reaches the 1000-kilowatt rating of the generator, the blades change pitch automatically in response to a Woodward governor to avoid overspeeding and overloading of the unit.

Motors manufactured by Bodine Electric Co., 2250 West Ohio, Chicago 12, are standard equipment on propeller governors. Although tiny in size, they are said to be rugged, furnishing dependable motive power for the intricate governor mechanism.

Designers of this windmill predict a big future for aero-electric power under peacetime conditions with units available for use on sites where good wind conditions prevail to produce power at approximately 5 mills per kilowatt hour.

—o—

A special-purpose synthetic rubber, developed by Hycar Chemical Co., Akron, O., permits manufacture of fast-cutting, long-lasting abrasive wheels for the metal working trades. Hycar is said to be the only possible substitute for natural rubber in bonding grinding wheels, is compatible with resins, and has good heat resistance.

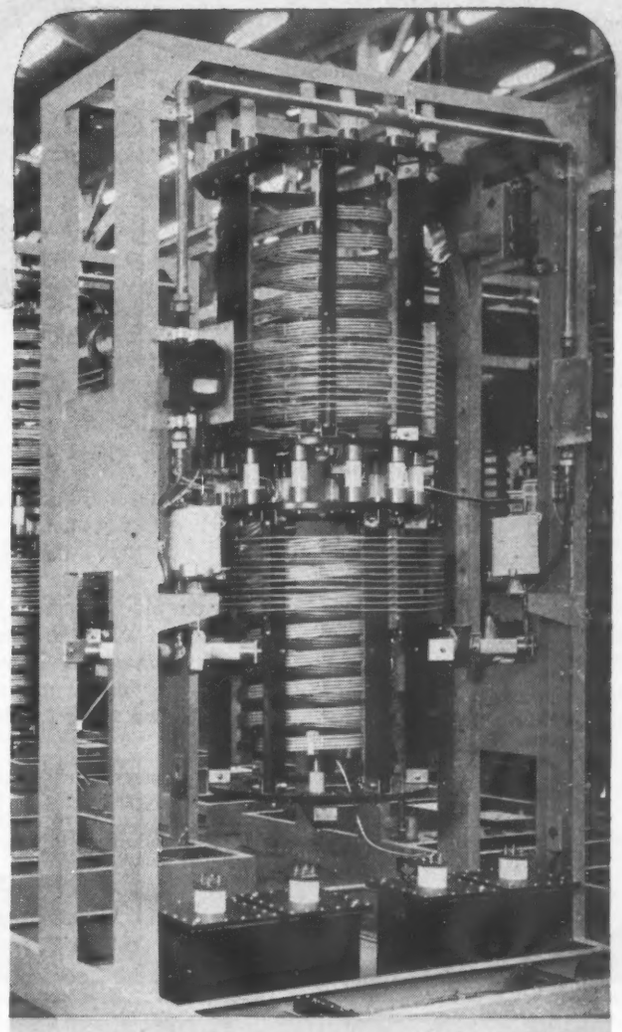
It's a High-Powered Induction Heating Source-

YOU'LL WANT THE PRODUCTION ADVANTAGES OF EQUIPMENT LIKE THIS—BUT—IS YOUR ELECTRICAL WIRING PLANNED TO CARRY THE LOAD?

New, efficient equipment of every kind promises tremendous postwar production advantages. Don't let lack of electrical capacity bar you from such opportunities.

Make sure your wiring plans are based on *future* needs, not *past* experience. Remember, rush teardowns for alterations will be costly. Wire ahead!

Now is the time—while you're in the planning stage—to call in your consulting or plant power engineer, electrical contractor or power salesman. They'll agree *foresighted* wiring will cost a lot less than the "wait and see" kind. 45288



Westinghouse

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Battlefield Scrap

(*Concluded from Page* 105)

the economics of processing or the quality of the steel produced is covered briefly below.

A copper content up to 0.15 per cent is not harmful, however, should the copper run over 0.25 per cent, it is detrimental to the surface quality. It causes seams and surface defects. Ingots containing copper over 0.25 per cent should be cooled completely before placing in the soaking pits and heating for rolling should be done with the least possible oxidation. Where the copper content is high the presence of nickel is helpful. A ratio of 2 parts of nickel to 1 part of copper should be maintained. The presence of copper in the finished steel is, however, not detrimental to the interior quality.

Tin in amounts less than 0.1 per cent adversely effects the mechanical properties of medium carbon steels.

Zinc will be removed by oxidation.

Lead reacts with the refractory lining of the furnace and will cause perforation of the bottom. The presence of leaded brass in the scrap will destroy the lining of the furnace.

Boron does not present a problem as it is oxidized during the melting practice.

Arsenic is present in German ores up to 0.20 per cent and is not removed by the melting process and is, therefore, present in German steels. The most that can be said of arsenic when present in small amounts is that its effect on the finished steel should be studied as it is reported it has some effect on the toughness and response to heat treatment.

The true solution to the problem of the use of battlefield scrap is definitely one of proper segregation. It is probably impracticable to segregate scrap on the battlefield but it is absolutely necessary that it be segregated before it reaches the steel mills if it is to be utilized without having an undesirable effect on the rapid and economic production of quality steel.

The use of spark testing is suggested as a method of separation and this method is now being employed. A spectrograph is definitely indicated where the highest degree of separation is desirable and when a knowledge of small amounts of detrimental elements is required.

One should not be unduly alarmed that the use of battlefield scrap will materially effect the production or quality of finished steel if it is recognized that the problem is one of proper segregation.

—o—

A folder describing a radium application service is available from Lustrolite Cleveland Corp., 6927 Carnegie, Cleveland 3. It contains information on the scope and advantages of radium applications. Uses such as aircraft instruments, meter dials, calibration markings, safety markers, signs, indicators, levels, control panels, wall switchplate locators, guide signs, tapes for dark corridors and mine tunnels, and luminous warning signals are mentioned.

Advertisement APRIL, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Profits vs. Spoilage

Imparting Special Properties to Metals Designed for Fabrication Purposes

What are some of the greatest enemies of profits? Among the most obvious are spoilage and extra operation costs. If these can be reduced substantially, profits will quickly rise.

First of all, let us carefully analyze the causes of spoilage and extra operations. It is true that fabricated articles may be rejected for mechanical defects resulting from careless workmanship. We shall not go into this phase here but shall consider the problem of spoilage and high costs from the metal specifications angle only. When a piece of tubing splits during a flanging operation or when wire shears in a severe heading operation, is the metal too hard? Should a more ductile alloy have been used? If costs are too high is it because it was necessary to use more operations than shown on the estimate when the job was accepted? Is trouble encountered in machining? Are polishing costs excessive because the metal had an "orange peel" surface? Are finished articles rejected because they cracked or wore out too rapidly in service?

Low fabrication costs depend largely upon mass production methods involving few but severe operations and the minimum of labor. It is obvious, therefore, that the material to be fabricated must meet special requirements and be very uniform in properties and in gauge dimensions. This means that every job must be carefully analyzed periodically for both metal specification and manufacturing methods. Improvements in materials and production methods resulting from research may reduce costs if applied.

Much progress has been made in recent years in the manufacture of copper base alloys. Fabricators recognize that physical properties depend largely upon manipulation—that is, whether the material is in the cast, extruded, rolled, drawn or annealed condition. Properties such as ductility, toughness, springiness, strength and stiffness, are controlled either by the temperature of anneal or by the amount of reduction by rolling or drawing following the last anneal. Machinability, corrosion resistance, hot and cold workability are controlled largely by modifying the basic compositions and by adding small quantities of additional metals. To meet exacting specifications and to control uniformity, Bridgeport leans heavily on the Laboratory with its scientific control and research. Realizing that metallurgy is a highly specialized science, customers are invited to present their metal problem for solution.

Importance of Annealing or Softening By Heating at Elevated Temperatures

Work-hardened metal can be softened by annealing; that is by raising its temperature high enough to affect its structure. Different degrees of softness are obtained by controlling the temperature which the metal attains in the furnace and the length of time it is exposed to the heat. Under the microscope a piece of annealed metal that has been prepared by polishing and etching for microscopic examination appears to be made up of irregularly shaped crystals or grains. The higher the annealing temperature, the larger the crystals and the softer the metal, and the greater its elongation or stretch. Grain structure also affects the tensile strength; the smaller the grains the higher the strength and hardness.

When thin gauge strip metal is formed or stretched, the size of the grain affects the surface appearance. A coarse grain imparts an "orange peel" surface. A fine grain gives a smooth surface which requires less polishing when a highly buffed finish is required. Space does not permit too much detail regarding the effect of grain size on cupping, drawing and upsetting operations. We know that the grain structure has a profound influence on breakage and finishing costs. For this reason the mill considers the annealing operation one of the most important in metal processing and therefore carries a large investment in special furnaces and temperature and atmospheric control equipment. In many instances the fabricator must also anneal parts that require more than one cold working operation for completion. The annealing operations performed by him are just as important as those performed by the mill.

The degree of anneal should not be designated by such general terms as "light", "semi", "soft", or "dead soft." To avoid misunderstanding, A.S.T.M. specifications express the degree of anneal in specific grain sizes with maximum and minimum limitations. A.S.T.M. specifications also include chemical compositions, physical properties and dimensional tolerances.

Importance of Temper or Degree of Hardness

Since stiffness, hardness, and degree of tensile strength of wrought metals depend upon the amount of cold working which the metal receives after the last anneal it may range in tensile strength from 38,000 p.s.i. in the annealed condition and from 80,000 to 100,000 pounds p.s.i. in its hard condition depending upon the amount of cold working and the composition of the alloy. In the manufacture of various articles the strength and degree of stiffness of the metal is of the utmost importance. For this reason the fabricator should supply definite specifications which indicate the temper or degree of hardness of sheet, wire, rod and tubing, and thus avoid costly misunderstandings.

Temper of Flat Rolled Products

In standard mill practice, the reduction by rolling is figured on the basis of thickness only because the metal does not widen very much during the rolling operation. The degree of rolling is expressed in Brown and Sharpe gauge numbers which were developed many years ago and which have a definite relationship to each other. For example, in the Brown and Sharpe gauge system the gauges are reduced by 50% every six numbers as shown below:

No. 2 B&S is .2576 inch
No. 8 B&S is .1285 inch
No. 14 B&S is .06408 inch

The following standards for hard rolled metals have been universally adopted for strip and sheet by the brass industry as given in A.S.T.M. specifications:

Temper	*Rolled B&S*	*Percent Reduction In Thickness*
Quarter hard	1 B&S no. hard	10.95%
Half hard	2 B&S nos. hard	20.7 %
Three quarter hard	3 B&S nos. hard	29.4 %
Hard	4 B&S nos. hard	37.1 %
Extra hard	6 B&S nos. hard	50.15%
Spring	8 B&S nos. hard	60.5 %
Extra spring	10 B&S nos. hard	68.65%

Suppose you wished to obtain metal .010" thick, "hard" temper. Metal .010" thick corresponds to 30 B&S. The mill takes 4 nos. B&S thicker than No. 30, namely, No. 26 (.0159), anneals it, then rolls it to No. 30 without intermediate anneal, leaving it in its rolled condition at this finishing thickness. For uniformity of temper, the grain size of the metal in the annealed condition before the final rolling must be controlled.

(Continued on page 2, column 1)

Profits vs. Spoilage

(Continued from page 1)

Temper of Drawn Wire

When drawing wire through a die the percent reduction is based on the difference in cross-sectional areas. Here also the B & S gauge numbers are used as well as percent reduction to indicate the temper of drawn material.

Temper	Nominal Reduction B & S Gauge Nos.	Percent Reduction in Cross-Sectional Area
Eighth hard	½	10.9%
Quarter hard	1	20.7%
Half hard	2	37.1%
Three quarter hard	3	50.0%
Hard	4	60.5%
Extra hard	6	75.0%
Spring	8	84.4%

The trade uses other designations for special tempers such as "rivet temper" (usually between 8% to 20% reduction in cross sectional area), machine screw temper (between 10% and 20% reduction) and wood screw temper (between 15% and 37% reduction). To play safe the manufacturer of screws and rivets should try out several samples of wire of different tempers before he determines on the one which best serves his needs.

Temper of Rod

The tempers on rod do not necessarily follow the percent of reduction used for wire but depends upon the physical properties required. To avoid misunderstandings the mill prefers to have the tempers of rod and wire expressed in "percent reduction in area by cold working." Free turning brass rod, however is generally furnished in a standard temper that has been developed for the various sizes after practical experimentation. Special screw machine items made from free turning rod which must be roll threaded, knurled, or swaged require special tempers depending on the severity of the operations.

Temper for Drawn Tubing

When supplying cold drawn tubing the temper is based upon the difference in cross-sectional areas before and after drawing. The commonly accepted terms for designating temper of tubing are even less definite than for rod and wire. "Light drawn", generally indicates a percentage reduction in area, by cold working, of 10% to 25% and "hard drawn" a percentage reduction in area, by cold working, of over 25% after the last anneal.

The term "percent reduction in area" as applied to tubing is somewhat complicated. A simple explanation is that this term "percentage reduction in area" is the percentage difference in cross-sectional areas of the tube before and after drawing. For example, an annealed tube 1" O.D. x .065" wall has a cross-sectional area of .191 square inches. When drawn to 13/16" O.D. x .049, its cross-sectional area is .117 square inches, resulting in a percentage reduction in area by cold working of 39.0%.

Tubing for screw machine work without any subsequent cold working operations can be drawn as hard as possible with the reduction in area depending upon the size. On the other hand, tubing for screw machine work which has to take some light cold working operation after machining would be furnished in a "light drawn" temper, the reduction depending upon the severity of the operation. Also, a tube for bending would be furnished in a temper indicated as light drawn, the degree of reduction depending upon the amount of bending. Orders calling for "hard" temper, "half-hard", and occasionally "quarter hard" do not indicate actual requirements. Consequently, full information should be furnished regarding the actual use of the tubing so that the proper temper can be supplied. The term "percentage reduction in area" by cold working is more definite and less subject to error.

In closing, it should be emphasized that proper attention to the subject of correct metal specifications will pay for itself many times over in eliminating costly mistakes and misunderstandings. Valuable time will be saved for both the fabricator and the mill. Our laboratory will be glad to help in keeping metal specifications clear and accurate.

Duronze Manual Available

This manual containing tables, charts and other physical data about Bridgeport's DURONZE ALLOYS is available for engineers and designers. Write on company stationery for a free copy of this 80-page technical booklet.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Metal Coloring for ferrous and non-ferrous metals is claimed to be achieved by a process of chemical immersion. A lengthy range of colors is said to be obtained in iridescent or matte finishes and that many of the coloring baths increase the corrosion resistance of the metal. The coloring materials are furnished in either salt or solution form. **No. 599**

Boring and Milling Machine is reported to bore, turn, and mill on same set-up. The machine was designed for jobs where turning, boring, and milling had to be done on the same work piece and where it was essential to save time. **No. 600**

A Self-Sealing Coupling is said to make possible the disconnection and reconnection of hydraulic or other lines without loss of fluid or inclusion of air. Service experience has shown that there is practically no restriction when coupling is completely coupled, and consequently can be successfully installed in suction lines. **No. 601**

A Magnetic Automatic Coolant Separator has been developed for installation on honing machines, grinding machines, and other equipment. It is stated that the new separator uses permanent magnets for moving metal and abrasive particles from honing coolants having a non-soluble base. **No. 602**

An X-Ray Spectrometer is said to permit quantitative determination by unskilled operators of the compositions of crystalline mixtures without photography, measurement, or computation. The method not only quantitatively identifies chemical substances, such as metals formed by powder metallurgy, alloys for phase determination, ceramics and refractories, boiler scale, and paint pigments, but also their state of combination in a given material. The instrument is said to make routine measurements of particle size in the range from colloidal to 0.1 micron. **No. 603**

A New Moisture Meter is claimed suitable for rapid moisture determination in powdered and granular materials such as soaps and molding powders. Of electronic type, it is said to be simple in construction, yet extremely sensitive. **No. 604**

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT 2, CONN.—Branch Offices and Warehouses in Principal Cities

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WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

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Established 1865

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

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COPPER WATER TUBE.

FABRICATING SERVICE DEPT.—Engineering staff.

BRASS AND COPPER PIPE

Note: Bridgeport products are supplied in accordance with existing priority regulations.

*Trade name.

BRIDGEPORT **BRASS**

Rust Preventives

(*Continued from Page* 108)

protect products within a plant between operations; it permits easy preservation of wet parts (from cutting or cooling compounds) in one simple immersion. It will remove traces of water remaining from final rinse after cleaning part. The water-displacing corrosion preventives can be used as special solvent cleaners and, combined with traces of water, exhibit good perspiration-residue-removing properties when used after an organic solvent cleaning procedure.

Perspiration residues ordinarily contain acidic organic materials, salt, etc. The organic portion is removed by solution in the solvent while salt and other water soluble components are taken into solution by the water present. After residues are dissolved, preservative ingredients form a film giving temporary protection to the metal surface to prevent redeposit of contamination. Effectiveness can be checked readily by applying a drop of synthetic perspiration or a fingerprint to a thoroughly cleaned metal surface, drying it quickly in an oven, agitating that surface in corrosion preventive and then placing it in a 100 per cent relative humidity chamber for an accelerated corrosion test. If only cleaning effects of preventive are being checked, residual film should be washed off with petroleum distillate such as Stoddard solvent and a light oil-type corrosion preventive applied to surfaces before placing metal in humidity chamber.

Perspiration Formula Given

Synthetic perspiration can be made by dissolving 7 grams of sodium chloride, 1 gram urea and 4 grams lactic acid in 250 cubic centimeters of 50-50 mixture of distilled water and ethyl or methyl alcohol. When ready for use, 1 cubic centimeter of this concentrate should be diluted with approximately 4 cubic centimeters of alcohol to aid quick drying of applied drop. One drop is equivalent an average fingerprint from a perspiring hand.

If solvent content is low and application is by spraying or brushing, possibly in several coats, the final corrosion preventive film from a solvent-grease type compound (combination of solvent and either oil, grease or wax-type preservative) will be relatively thick and compare in properties with films obtained from direct application of heavy grease types. However, under normal circumstances, final grease or oil film will be relatively thin.

Fourth solvent preventive type is a water-soluble compound, an emulsified grease type, removable by solvent. It is used in industrial work and its record of protection in indoor and outdoor exposure is excellent. Cost is relatively low. Dilutions range from 1-5 to 1-20 with water; water evaporates, leaving a non-porous greasy film.

In the group of strippable plastic type preventives are materials consisting of a

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flexibility
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Another PRODUCT of CLARK EQUIPMENT COMPANY
Load carrying vehicles must be flexible to handle many types of materials.
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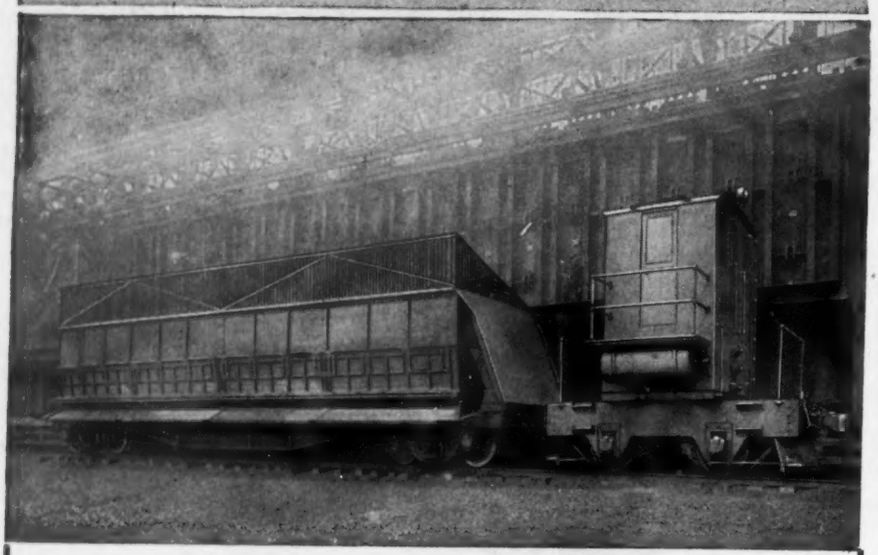
COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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combination of special oils, inhibitors, plasticizers, synthetc resins and plastics. Applied coatings are from 0.0005 to 0.00001-inch thick, and are unique in that they provide both excellent corrosion prevention and "cushioning" or mechanical protection, are removed by simple slitting and peeling. Approved for products not harmed by dipping temperatures required and those of regular contour for practical stripping.

Selection of Preventive

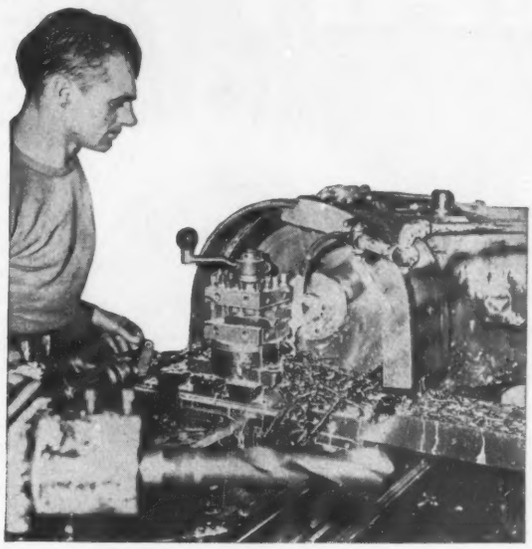
In choosing a corrosion preventive, there are certain fundamental points which almost automatically indicate a certain type of material. They may be outlined as follows:

1. Protection.
2. Function other than protection (such as lubricating qualities).
3. Removability.
4. Product to be protected—
   (a) Composition
   (b) Surface
   (c) Construction.
5. Application.

The life or protectiveness of various compounds can be determined relatively by means of various accelerated tests of which there are dozens. However, the several types of corrosion test procedures generally accepted are in high humidity test, the salt spray test, and synthetic weather cycles. The first two are strictly relative tests, while the synthetic weather cycle is an attempt at accelerating actual field conditions. In any of the three virtually hundreds of variables must be closely and accurately controlled to get reproducibility.

The high humidity test is essentially exposure of test panels coated with corrosion preventives to test conditions of 100 per cent relative humidity at 100 degrees Fahr. and noting first appearance of corrosion and total corrosion after a given additional period of exposure. To reproduce conditions of some tropical locations, some agencies recently have accelerated the test by raising temperature to 120 degrees. (See Fig. I.) Standard surface roughness and high cleanliness must be maintained on test pieces. Temperature variation must not exceed 1 or 2 degrees, and test atmosphere should be saturated. Air change should be uniform and constant.

In the salt spray test, panels to be exposed are coated with corrosion preventives to an atomized mist of sodium chloride and time and amount of corrosion is noted. Either a 3.5 or a 20 per cent salt solution may be atomized and the atomizing chamber may be either at room temperature or at 95 degrees Fahr., in either case closely controlled. Rate of atomization should be standard and impingement of air stream or mist on panel surfaces should not be allowed. Venting must be present and air changes should occur in chamber at least 5 times per hour. In salt spray cabinet shown in Fig. 2, accelerated effect of salt air or water is produced in accordance with Army-Navy standards,



We Will Prove These Facts on Your Own Work . . . PERFECTED LUBEWELL CUTTING COMPOUND GIVES SUPERIOR FINISH AND CLOSER TOLERANCES ON ALL TYPES OF WORK REGARDLESS OF THE MACHINE TOOL BEING USED.

Rather than give you isolated production figures gathered in other plants, G. Whitfield Richards will ship you any quantity of Perfected Lubewell for comparison in your own plant. If you find that it does not 1. increase tool life up to 50%; 2. increase machine production up to 25%; 3. give a superior finish and closer tolerances; 4. lower cutting lubricant cost as much as 40%; then tear up the bill. Costing from 3 to 9 cents a gallon in the machine, Perfected Lubewell is outperforming from coast to coast.

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concentration and temperature being accurately controlled. Heated salt water is atomized and blown through the closed cabinet by compressed air.

No standard weather cycle is yet accepted and usually cycles in these tests are specifically designed to accelerate the conditions of some given locality. Usually included are stages in humidity chambers at varying temperatures or humidities, in salt spray chambers, under rain showers, immersion in water or even solutions of corrosive materials and, in addition to varying temperatures, exposure to varying intensities of ultraviolet light. Generally, these simulated weather tests are more severe and accelerated than the other types. Data obtained from them, when interpreted with a broad background of production and field experience, can give a fairly reliable life value for a corrosion preventive compound in actual field use. Corrosive factors then can be considered one by one, and preservative chosen.

Protection Time Considered

Effectiveness of a preventive must vary directly in proportion to protection time required, varying from a few days to years. Allowance should be made for the heavy grease type preservatives so that "flowing point" is sufficiently above the highest temperature expected in service. Solvent or oil types will be thinned by high temperatures, but to a lesser extent. These two conditions will determine the intensity of other factors, namely, humidity or moisture vapor content in the air (the wetter the expected atmosphere, the more effective must be the preservative); salt water mist or salt water wave splashing (requiring selection of the best possible corrosion preventive); corrosive fumes from burning of coal containing sulphur, acid fumes from chemical processing areas, and even carbon dioxide from combustion of fuel combining with moisture to form a weak but corrosive acid (conditions requiring more effective, heavier preventives).

Where it is desirable to combine protective qualities with lubricating or hydraulic requirements this can be done to a limited extent. Recent U. S. specifications such as AXS-934, AXS-674 and AN-VV-576a are preservatives with lubricating qualities. The first two are specified for certain purposes in preservation of machinery during shipment and storage. Even if machine tools should be operated temporarily with these products in the reservoirs instead of regular lubricating oils, lubricating value is sufficiently high to prevent damage.

Preventives that are very difficult or impossible to remove by simple solvent means should not be used, for there will be cases where the receiver of a product has no more equipment than a can of gasoline and a rag. At least, the preventive should be removable by soaking and brushing in common petroleum solvents.

Composition of a product is a major consideration. Whenever there is plastic, rubber, leather, fabric or other or-

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★

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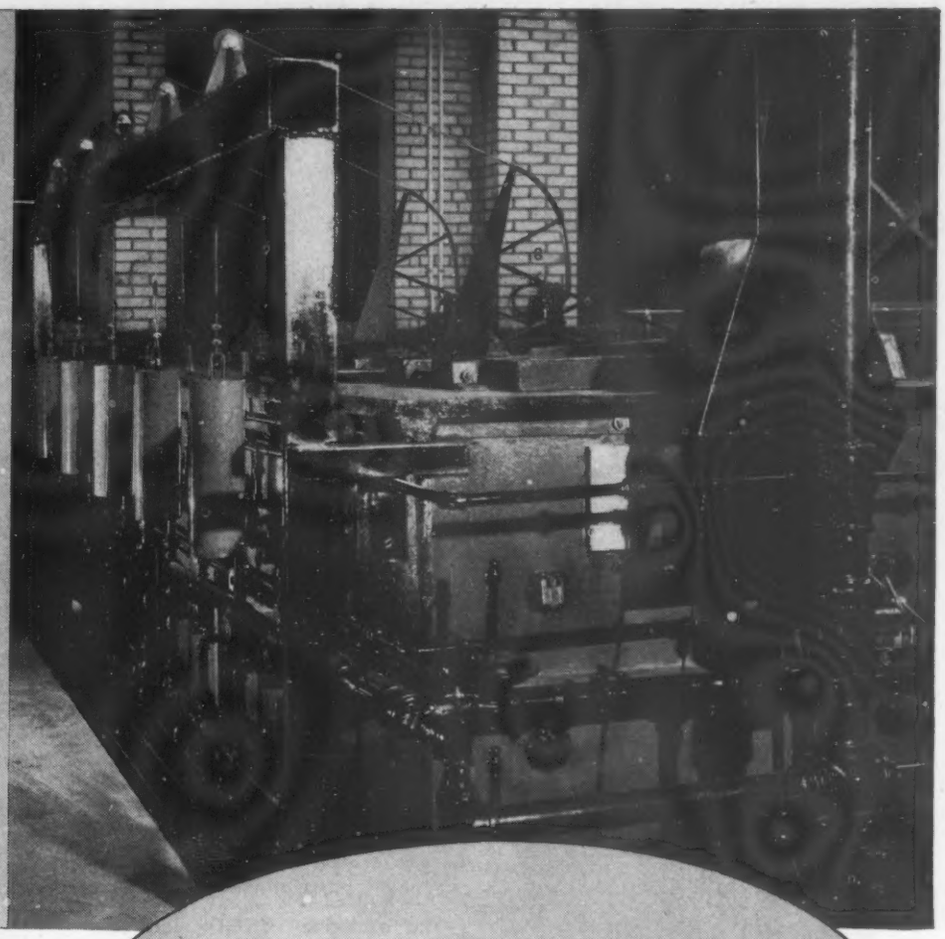

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Helps Clippers Keep Busy Schedules

n the new maintenance shops of Pan American World irways at La Guardia Field, New York, aluminum rts are heat treated with Gas in a large salt bath. This nteresting installation is another tribute to the speed, exibility, economy and precision control of this modern ndustrial fuel.

Using radiant heat, the furnace operates between 650°F. r annealing and 920°F. for solution heat treating. ince the furnace is used intermittently, time required for eating up is very important; also, in bringing the salt ath to operating temperature, and maintaining it there, xact control of temperature and uniformity of heating re demanded; Gas was selected as the fuel because it lone met these requirements.

Besides economy in operation and upkeep, this Gas rnace, by speeding turn-around time of the giant lippers in the shops, helps reduce revenue hours lost om their world girdling schedules.

Discuss your heat treating processes with the Industrial Engineer of your Gas company. He has much helpful data at his command.

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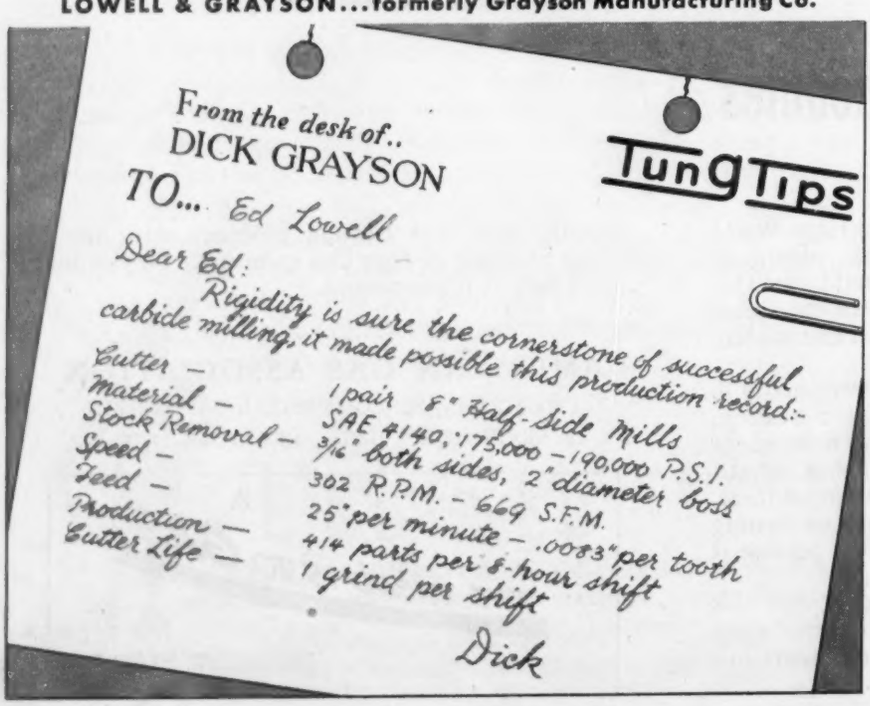
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DICK GRAYSON
TO... Ed Lowell
TungTips
Dear Ed:
Rigidity is sure the cornerstone of successful carbide milling, it made possible this production record:-
Cutter — 1 pair 8" Half-side Mills
Material — SAE #1140, 175,000 – 190,000 P.S.I.
Stock Removal — 3/16" both sides, 2" diameter boss
Speed — 302 R.P.M. – 669 S.F.M.
Feed — 25" per minute – .0083" per tooth
Production — 414 parts per 8-hour shift
Cutter Life — 1 grind per shift
Dick

ganic material combined with metal, the ideal treatment is to apply corrosion preventive on the metal surfaces only. When this is impractical and entire product must be covered, a heavy, almost waxy type preventive should be used, as the oil type would ruin parts of natural rubber and probably slowly attack most synthetic rubbers and plastics. Solvent types, on even very short contacts, may ruin many plastics.

Dimension smoothness or polish of a metal surface, particularly of brass or copper, is an important consideration. Occasionally some corrosion preventive may contain inhibitors or surface active agents which tend to tarnish such surfaces. Staining need be watched for only in cases of very high precision or polish.

Consideration of the construction of a product—its contour, irregularity or complexity—is likewise important. The order of decreasing difficulty of obtaining continuous protective coatings on complicated surfaces is (1) the strippable plastic type; (2) heavy oil or grease type; (3) oil type; and (4) solvent type. A standing rule can be: The more delicate the product, the lighter the preservative.

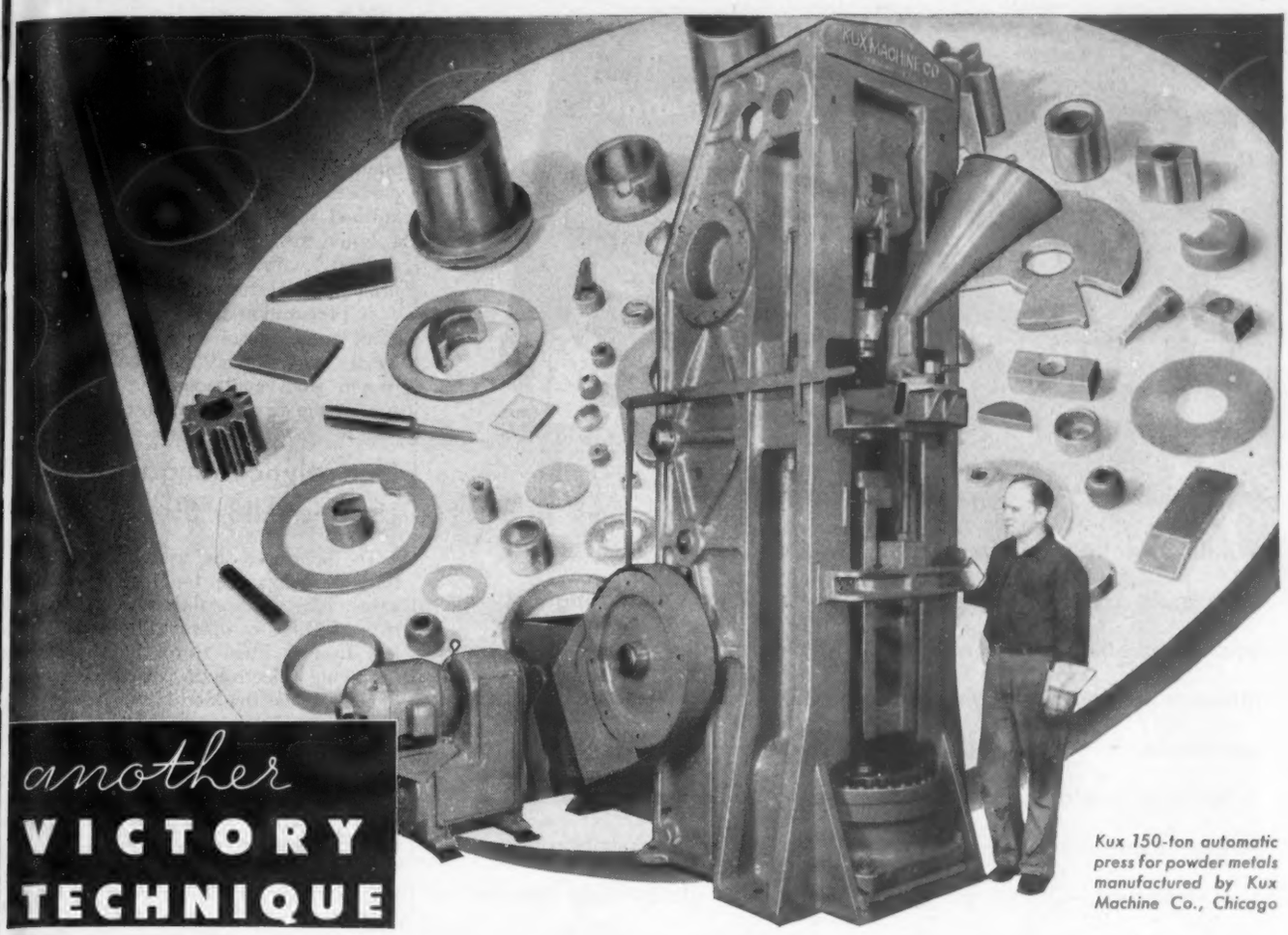
Solvent Type Preventive Used

Products having surfaces chemically treated to deposit corrosion-resistant coatings of phosphates, oxides, sulphides, etc., may well be treated with oil or solvent type preventives rather than heavy grease varieties, and yet maintain excellent resistance. Many chemical coatings assist in adsorbing, absorbing or holding by capillarity, thicker oil films than normally result on bare metal surfaces. This in combination with inert chemical coating itself can give corrosion protection as good or better than heavy grease types on an untreated metal.

Once the proper corrosion preventive has been chosen and applied to a product either by dipping, spraying, brushing or slushing, the job still is not finished until one of the two following conditions has been satisfied. These are: Need to provide means for keeping that protective film intact for proper functioning after complete protection is attained, and need to provide additional means for protection where conditions will not permit selection of a preventive offering complete protection by itself.

In the first instance, there must be careful handling of a preserved product so that films are not injured or wiped off in storage of transport. In the second instance, there may be applied around the product protective barriers which are waterproof and even moisture vapor proof. Use of drying agents within some packages may be necessary. Amount and kind of additional packing will be determined by degree of extra protection required to get product to its end use.

All machine tools, prior to conditioning for storage, must be connected to a power source to permit cleaning and flushing of hydraulic and coolant sys-



another
VICTORY TECHNIQUE

Kux 150-ton automatic press for powder metals manufactured by Kux Machine Co., Chicago

A NEW NOTE IN THE METALLURGICAL SYMPHONY... *Powder* METALLURGY

BEFORE the ancients worked with molten metal they fabricated simple implements from metal powder. Yet it was not until the vast needs of World War II that the development was forced to practical proportions. Now thousands of parts pressed from powdered metals and sintered in a controlled atmosphere furnace are being used in weapons of war and accessories at a great savings of time or cost or both.

One order of 40,000,000 small parts was produced for the navy at the rate of 520 pieces per minute by powder metallurgy. A piece of Ordnance from powder metal effected a saving in cost of about 70%. And the same story applies to a vast multitude of parts from powdered iron, bronze, aluminum, silver, tungsten, platinum.

Powder Metallurgy is one of the many Victory Techniques that have infinite postwar possibilities and about which you must learn if you are to meet competition. Your Lindberg representative is eager to help you in any possible way. Discuss with him the new developments in powder metallurgy, sintering, brazing, and treatment of metals by heat in any form.

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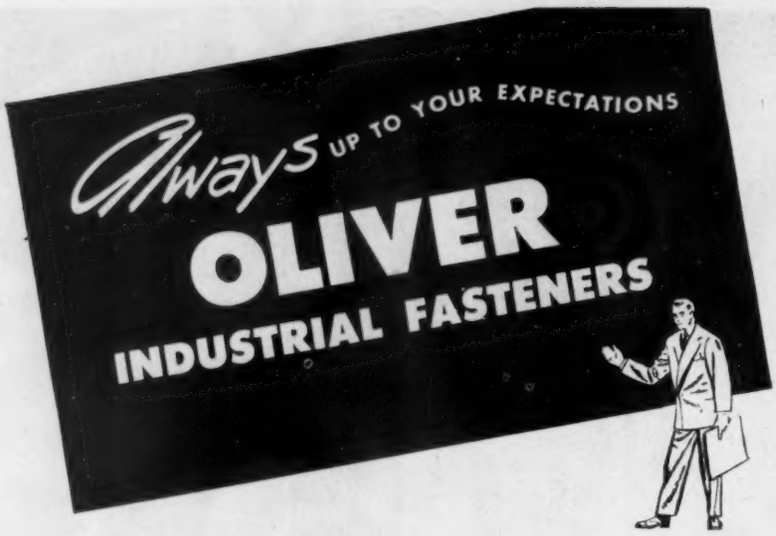
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening



Whatever your requirements for bolts, nuts, rivets or cap screws, you will find that Oliver Fasteners measure up to your highest expectations.

Made by one of the oldest and largest manufacturers of industrial fasteners, Oliver products represent the most modern ideas in design and manufacture. We offer a complete range of sizes and types, with materials, heat treatments, protective coatings and other specialized features to meet your particular needs.

Our nearest district representative will gladly help you solve your fastening problems.

Bolts

Square and hexagon head machine bolts, carriage bolts and a wide variety of types for particular applications. Rolled or cut threads; black, milled or ground body. Special types for high temperature applications. Sizes up to 2½ in. diameter.

Rivets

Sizes up to 1¾ in. diameter, all commercial heads and lengths. Materials include low-carbon steel, boiler steel, structural steel, copper-bearing steel, wrought iron. Annealed, high strength, close tolerance and other special properties where desirable.

Nuts

All regular types of nuts including square, hexagon, castellated, slotted, cold punched, hot pressed, double chamfered, semi-finished. Carbon steels, alloys, non-ferrous. Sizes up to 2 inches bolt diameter.

Cap Screws

Oliver Cap Screws meet your most exacting requirements for accuracy, uniformity and highest quality. Our long experience in the manufacture of headed and threaded products, gives the knowledge and skill necessary to produce dependable cap screws.

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tems. All removable accessories and attachments must be removed, cleaned, rust-protected, packaged and attached to the machines. Lubrication and cooling systems must be drained and filled with the prescribed rust preventive. Exposed operating surfaces should be sealed at crevices or cracks. Any rust spots on finished surface should be cleaned with a liquid rust remover, wiped dry and slushed with fingerprint neutralizer, prior to final rust-preventive treatment. This preparation is prescribed for shipment or storage of machine tools owned by the government and due to be returned from contractors upon termination of the war production program.

Electrolytic Manganese Used in Alloy Steels

To determine the usefulness of electrolytic manganese for making manganese additions to stainless steel, the Bureau of Mines co-operated with the Rustless Iron & Steel Corp., Baltimore, by supplying electrolytic manganese produced at its Boulder City, Nev., pilot plant to make enough heats of steel to prove the merits of the pure metal in the rustless practice.

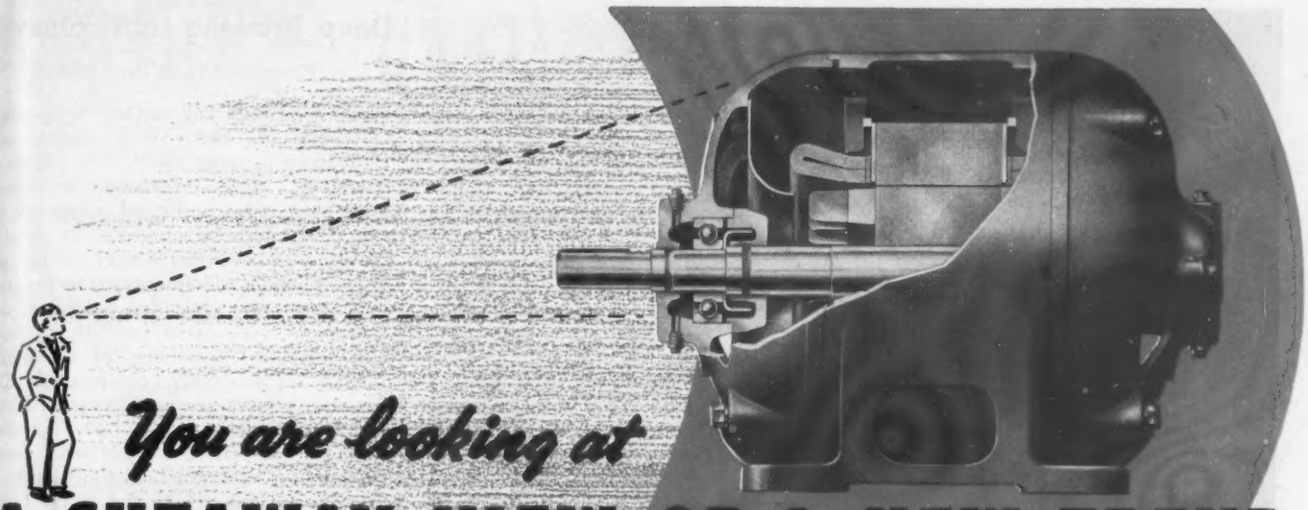
This grade of manganese was used in the manufacture of 22 different types of stainless steel. Advantages cited by the Rustless Corp. (War Minerals Report 225, Bureau of Mines, Wash.) are as follows:

1. No measurable increase in the carbon or phosphorus content of the heat, thus making it possible to meet difficult specifications more easily and to use larger proportions of readily available scrap alloy steel.
2. The product can be stored in a little space and weighed accurately.
3. Recovery of manganese was satisfactory regardless of whether the addition was made in the ladle of furnace.
4. For equivalent manganese additions, 20 per cent less weight of addition is necessary with electrolytic manganese with a corresponding decrease in chilling of the metal.
5. Owing to the convenience of handling, weighing and shoveling electrolytic manganese and the small bulk and weight of the addition, a small amount of time is required to prepare a heat for tapping.

Notwithstanding the present cost of electrolytic manganese per pound of contained manganese, the corporation has gone over entirely to the use of this grade of manganese for manganese additions to alloy steels.

—o—

A new 28-page bulletin describing a line of centrifugal coolant pumps is offered by Logansport Machine Co. Inc., Logansport, Ind. Pumps described include 27 sizes and types, each designed to keep pace with exacting requirements of manufacturers engaged in war production. It also contains helpful, practical engineering data, such as tables showing friction of viscous liquids and water in pumps.



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A CUTAWAY VIEW OF A NEW TREND

in motor design

Two decades ago the purchaser of squirrel-cage motors had but one choice—the open motor. If operating conditions proved too severe, the only answer was to be found in frequent replacements.

Then came a period of new development in mechanical design, which resulted in the birth of dripproof, splashproof, totally-enclosed, fan-cooled, and a host of other new types, each designed for operation under certain adverse conditions.

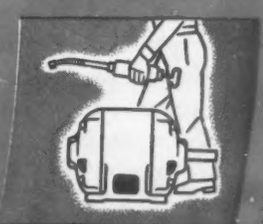
But today there is a new trend—represented by Crocker-Wheeler Protected-Type Motors. These motors, besides having the surplus capacity of open designs, provide protection against many of the most common hazards encountered in operation. They may be used for many services for which enclosed and partially-enclosed motors have been specified in the past, *and yet, Protected-Type Motors cost no more than open motors.*

When and Where to Use Protected-Type Motors

WHERE THERE IS DRIPPING LIQUID
Because Protected-Type Motors are dripproof; falling water, oil, or other liquids cannot enter the windings. All ventilating openings are shielded.

WHERE THERE ARE FALLING CHIPS
Protected-Type Motors are ideal for machine tool and similar applications where metal chips and other foreign matter might injure the windings of less well-protected motors.

WHEN INSPECTION VISITS ARE FEW AND FAR BETWEEN
Because rotors are practically indestructible, stator windings are amply insulated, and ball bearings require attention only annually (sleeve bearings are optional), Protected-Type Motors call for minimum maintenance.



FOR ALL GENERAL-PURPOSE APPLICATIONS
Rated 40C rise, full-load continuous duty, with a 15 per cent service factor, these motors are suitable for all general-purpose applications. Mounting dimensions conform to N. E. M. A. standards.

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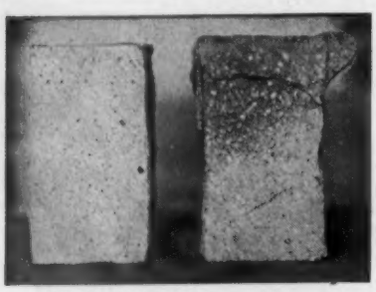
Steadily maintained temperatures between 2200°F and 2700°F cause vitreous spalling of clay fire bricks. Shutdown and temperature changes are hard on Silica Bricks.

RM Brand Semisilica Bricks are the answer to many such furnace problems.

Use them in furnaces where temperatures are maintained high enough, and long enough, to cause "First Quality Clay Bricks" or "Super Duty Bricks" to "Vitrify and Spall" or to "Shrink and Deform," yet where shutdowns or severe temperature changes prevent satisfactory performance of silica bricks.



Crosscut of fire brick showing the spalling of one brick due to vitrification and the absence of spalling in the RM brick which did not vitrify.

In STEEL MILLS:

For Heating, Reheating, Annealing and Heat Treating Furnaces, OH Regenerators, Blast Furnace Stoves, Soaking Pits, etc. In the roofs, where spalling failure is most prevalent, they perform their greatest service.

In MANY INDUSTRIES:

Such as Chemical, Ceramic, Zinc Smelting and other industries where continuous heats in the temperature range of RM's are required for their processes.

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HEDLEY STREET & DELAWARE RIVER
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REMMEY

Deep Drawing Lubrication

(*Continued from Page* 110)

hardness of steel tool surfaces by plating chromium on steel. While this is advantageous in many cases, it is a critical operation, since excessive brittleness must be avoided and good adherence to the steel must be obtained. It is also necessary to have a hard steel surface underneath the chromium plate to prevent cracking of the plate due to plastic deformation of the steel beneath it. As a consequence, the success of chromium plating has frequently been in doubt due to wide variations in performances. However, sufficient data has been accumulated to indicate its value when used properly[50]. This is due both to its hardness and its dissimilarity to the metal being worked. Dies made of tungsten carbide sintered in a cobalt matrix (Carboloy) has proven very successful because the particles of tungsten carbide are almost as hard as diamonds and, in addition, are nonmetallic, so that the tendency toward welding is reduced considerably.

Surface smoothness of tools is extremely important; the smoother the surface, the better the performance. This has been borne out by a large number of investigations[51], and in one series of experiments performed by the writer an improvement in tool life on the order of 400 per cent was obtained by changing the polishing technique so that smoother surfaces were obtained. In neither case was the maximum in smoothness obtained, but the improvement in tool life was, nevertheless, quite large. While maximum smoothness is desirable for tools, some intermediate roughness is ordinarily desirable for the work.

Excessive Welding Between Work and Tools

When welding between work and tools takes place, even over a fairly wide area, there is usually insufficient resistance to actually stop the draw press. Instead, tearing occurs in the body of the weaker of the two metals or at the weld itself. Naturally, the tools are selected for a higher tensile strength than the work so that, when welding occurs, there is a tendency for some of the metal being worked to be torn from its surface and deposited upon the tools.

Because of the work-hardening characteristics of most metals, resulting in increased tensile strength, the portion of the metal that is deposited or built up on the tools will be stronger than the metal subsequently passing over the tool. This results in further tearing within the body of the metal being worked after additional welding takes place between the build-up and portions of the work. In addition, the tendency for welding between the built-up metal and the work is greater than that between the tool and work.

These factors result in the build-up on the tools becoming progressively larger until it reaches such dimensions that the work is scratched or torn so that

QUALITY STEEL TUBING...

Then it was for wagon axles

Oldtimers at OSTUCO will tell you that during the Spanish-American war, one of the applications of tubing was wagon axles. Today again, one of the chief needs for steel tubing is for wartime vehicles. And the demand is for steel tubing to meet specifications that reveal as great progress in tube-making as there has been in transportation. But no matter how great the change in vehicle design, quality in tubing has always been of paramount importance at OSTUCO, where it is checked at every turn as demonstrated by the tensile test illustrated on this page —wherein tube sections are ruptured under tension to make sure OSTUCO seamless meets specifications of yield strength, elongation and ultimate tensile strength.

Constant checks on quality have resulted in wartime tubing delivery which has earned such comments as, "we have come to look on your company as an essential and contributing factor in helping us meet our production schedules" from many of America's industrial leaders.

Why not contact the OSTUCO sales office nearest you for tubing engineering service and data when you start working out your new plans for competitive production. The offices listed below are ready to serve you.

★ ★ ★

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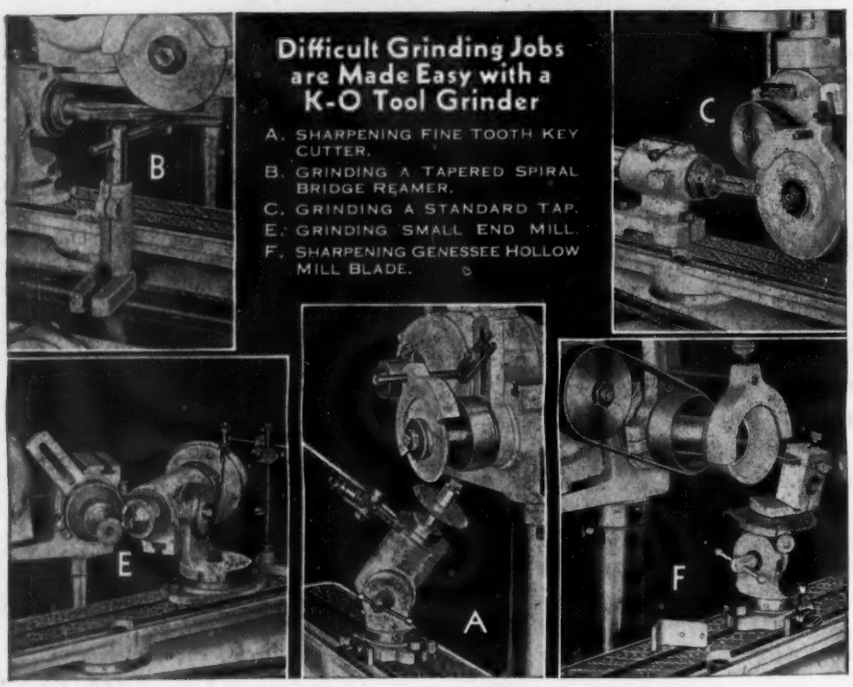
Difficult Grinding Jobs are Made Easy with a K-O Tool Grinder
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B. GRINDING A TAPERED SPIRAL BRIDGE REAMER.
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A
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E
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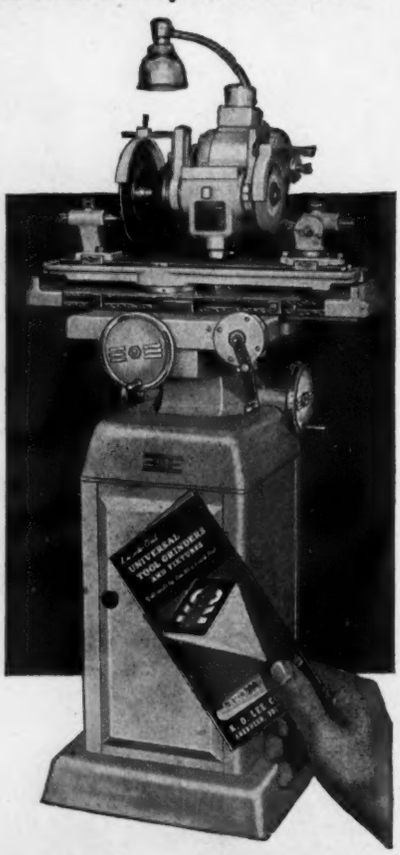
Not All Men and Machines Can Be Released When the War Ends... Some Must Stay on the Job!

When the war broke out, *Knock-Out* Tool Grinders were ready! They've been doing a Titan's job on production work and on tool maintenance throughout the nation and all allied countries. Now as the peace approaches, and thinking men are readying their plants for the tremendous production job which lies ahead, *Knock-Out* Grinders are again ready to accept the challenge!

***Knock-Out* engineers have continually stayed on the alert giving users of K-O Tool Grinders many advantages, making difficult grinding jobs easy.**

•Single Speed or Multi Speed Wheel Heads are available. Wheels ranging from 1 to 10 inches can be used. Tools from the smallest to 12 inches in diameter can be ground with speed and accuracy.

When writing for literature ask for Unit No. 37-45.



K.O. LEE CO.
ABERDEEN, SO. DAK.

it no longer can be useful. This process is known as scoring or galling, and when the welding reaches such proportion that the normal flow of metal is prevented, it is known as seizure.

Welding can be prevented if a sufficient quantity of surface contaminant (lubricant) is supplied to keep the metal surfaces separated so that the forces of intermolecular attraction are reduced to a negligible quantity. When surfaces are under the influence of shearing stresses, the ability to perform this separation depends upon the adherence of the contaminant or lubricant to the surfaces. Depending upon the magnitude of these shearing stresses, different types of lubricants may be employed.

Thus, when unit pressures are small, mineral oil, which is held to the metal surface by forces of physical adsorption, is sufficient. When unit pressures are considerably higher, fatty acids or other polar lubricants, which are held to metal surfaces by forces of chemical adsorption and polar orientation, are usually sufficient. This type of lubricant provides sufficient protection for many drawing operations that are not very severe especially in the case of the nonferrous metals.

Reactivity Up on Deep Draw

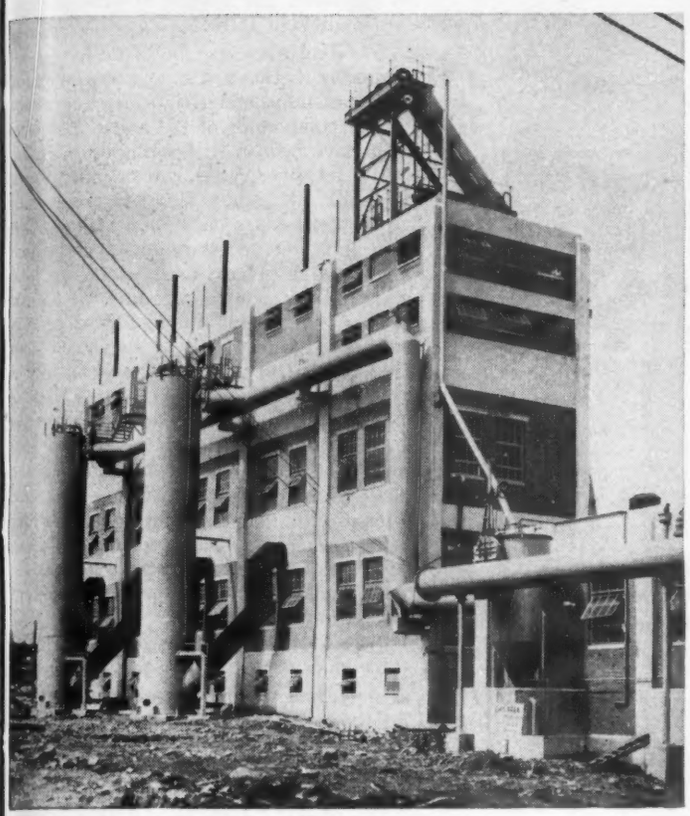
When unit pressures become very high and, in addition, temperatures are high, it is necessary to utilize lubricants that can react with the metal to form rigidly held chemical compounds which are not appreciably affected by high temperatures. This is the type of lubricant that must be used for most severe deep drawing operations, although the reactivity of the lubricant should increase as the severity of the operation is increased. In the case of nonferrous metals, reaction with oxygen in the air is frequently sufficient to provide a stable film thick enough to prevent welding on a large scale.

While rust or other oxides of iron are used in the case of some of the deep drawing operations performed with ferrous metals, it is usually necessary to have a more reactive extreme pressure lubricant. Oils or water-base emulsion containing sulphur, chlorine or phosphorus of varying stages of reactivity may be utilized depending on the thickness of coating required. The heat due to deformation of the metal and to friction is depended upon to cause reaction with the metal.

In addition, chemically inert fillers may be used in the lubricant as weld preventives. These may be trapped between the work and tools and thus mechanically separate the parts. In certain more severe operations, especially with ferrous metals, it is possible to deposit a layer of dissimilar, ductile metal by electrolytic means, hot dipping or chemical displacement. Copper, lead, tin, and, to a lesser extent, zinc have been used in this connection[83]. This method provides a layer of material that welds less readily with ferrous metal than would two ferrous surfaces and which, in addition, flows with greater ease than the ferrous metal.

In the chemical displacement method

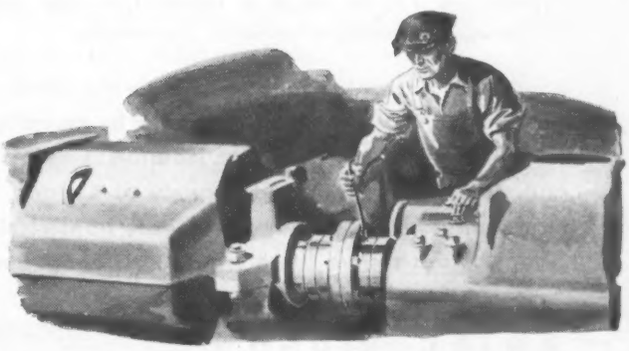
KOPPERS

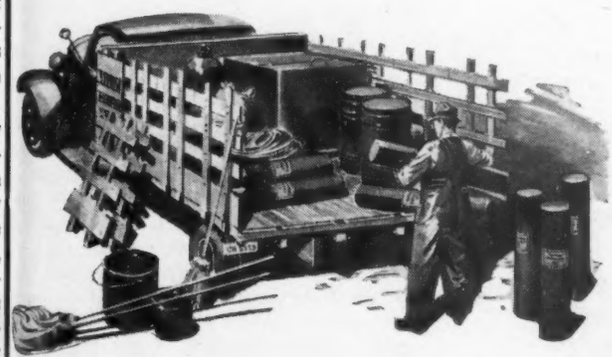


and Steel

Koppers-Kerpely Gas Producers have been developed to operate on either smaller sizes of coke or anthracite coal, and the gas produced has been supplied for underfiring byproduct coke ovens, vertical coke ovens and ceramic kilns; for the heat treating of metal; and for mixing with other fuel gases. 124 Koppers-Kerpely Gas Producers have been built to generate gas.

In Fast's Self-aligning Couplings, the load-bearing surfaces are protected against wear by a positive film of oil. This oil is kept permanently clean by rocking bearings which make precise, metal-to-metal contact and are in the one position where they form a permanent dust and moisture-proof seal. This is an exclusive feature with Fast's Couplings, which are made by the Bartlett Hayward Division of Koppers.





Koppers Coal Tar Roofs have an invaluable property known as "cold flow" which enables the roofing to heal small surface breaks automatically. This is especially valuable on roofs, as in a steel mill, where vibration, expansion and contraction, or settlement of the building may cause small surface breaks in the roofing.

KOPPERS COMPANY, INC.

Koppers Building, Pittsburgh 19, Pa.

KOPPERS

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THIS LAWSUIT COULD HAVE BEEN AVOIDED with KORFUND VIBRATION CONTROL

"The law guards jealously for all alike, the enjoyment of all private property. The right of enjoyment is surrendered in a factory district only to the extent of the inconvenience incident to the character of the business carried on there, no more.

"The ceaseless pounding of the vibrations from the defendant's engine against the walls of the plaintiff's mill is not incident to the neighborhood. The same annoyance would happen, under the same conditions, if both factories were on a farm. It was not a neighborhood hazard to be anticipated, and it is not one to be suffered. Community vibrations must be endured, but vibrating a community is a nuisance."

Above is a decision handed down by the courts of New Jersey. This lawsuit could have been avoided by mounting the offending machine on Korfund Vibration Isolators. Employing cork, rubber and steel springs in a wide variety of designs, Korfund Vibration Control will positively prevent the transmission of vibration. ***Write for descriptive literature . . . no obligation.***

KORFUND VIBRATION CONTROL

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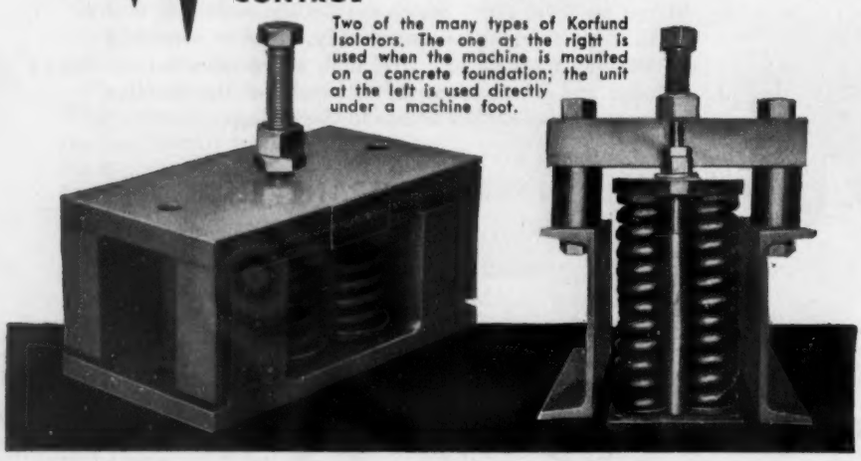
Two of the many types of Korfund Isolators. The one at the right is used when the machine is mounted on a concrete foundation; the unit at the left is used directly under a machine foot.



previously mentioned, the reaction of iron displacing copper from a solution of its salts may be utilized. To insure reasonably good adherence of the copper to the iron, this must take place in acid medium. However, when the acidity is too high or the copper salt concentration is excessive, the copper is produced in a nonadherent form*.

Welding also may be reduced by interposing between the surfaces a layer of nonmetallic material, which may consist of compounds of the metal. Deposits that have been used for this purpose are sulphides, phosphates, rust or other forms of oxide, etc. These deposits are placed upon the metal as a separate process, so that it is not necessary to depend upon the drawing process to generate the heat required for reaction leading to formation of the protective film, and protection is afforded immediately as the work comes in contact with the tool. The weakness of this type of lubrication lies in the lack of ductility of these deposits which results in high lubricant friction and which may cause flaking of the deposit during the draw. If an additional quantity of extreme pressure lubricant is not available the bare surfaces that are exposed as a result of this flaking will not receive a new deposit of stable compound and consequently welding will occur.

It has been found that when relatively thick films of low-melting lubricants, such as anhydrous soaps or waxes, are deposited on the work in fairly adherent form by some mechanism these films are not displaced during the drawing operation and are able to separate the metal surfaces to a considerable distance and at the same time provide a lubricant with very little resistance toward stress deformation. This results in low values for friction which tend to approach those obtained under conditions of fluid lubrication[58]. This is a very promising type of lubrication which has proved very successful in the several applications in which it has been employed. Something akin to this type of lubrication also is obtained in the traditional lubrication procedure of the wire drawing industry, in which a sull or rust coat is formed on the wire, which is coated with powdered soap prior to drawing.

A Hypothesis on the Mechanism of Metal Build-up on Tools

The mechanism of the formation of build-up of metal on dies has been a constant source of anxiety among those who work with drawing lubricants. It is a natural reaction to the sudden occurrence of build-up on tools and scratches on work, where none was visible a few moments before, to ascribe such effects to "dirt" or abrasive particles. This may have been a prime cause of the lack of progress on this subject. It is argued that there cannot be much difference among various lubricants, if difficulties are due to the random influence of abrasive

*A patented proprietary formulation which provides a bright, adherent deposit of copper is known by the trade name of Cuprodine. It consists of copper sulphate, sodium chloride and a pickling inhibitor.

USE THESE RACO ELECTRODES
FOR SUPERIOR WELDING OF CORROSION- AND HEAT-RESISTING STEELS
RACOLLOY 18-8
For fine performance on these classes of steel: Unstabilized 18-8, Types 301, 302, 304, 306, 308. These electrodes are used for parts intended to resist relatively mild corrosive conditions in service, or for parts that can be heat treated after welding. For example, dairy, distillery and restaurant equipment, and chemical tanks.
WELDING CODES—Racolloy 18-8 electrodes meet requirements of U. S. Navy Bureau of Ships Specification 46E4 (INT) Grade I.
RACOLLOY 18-8Cb
These electrodes containing columbium are used with exceptional success for all-position welding of Types 321 and 347. Applications include welding stainless steel pressure vessels for continuous service in the temperature range of 700° —1600° F. These uses include chemical plant, oil refinery equipment and aircraft exhaust collector systems.
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"dirt." While abrasive particles have some effect in causing metal build-up by exposing clean surfaces, their effect probably is considerably less than is generally believed.

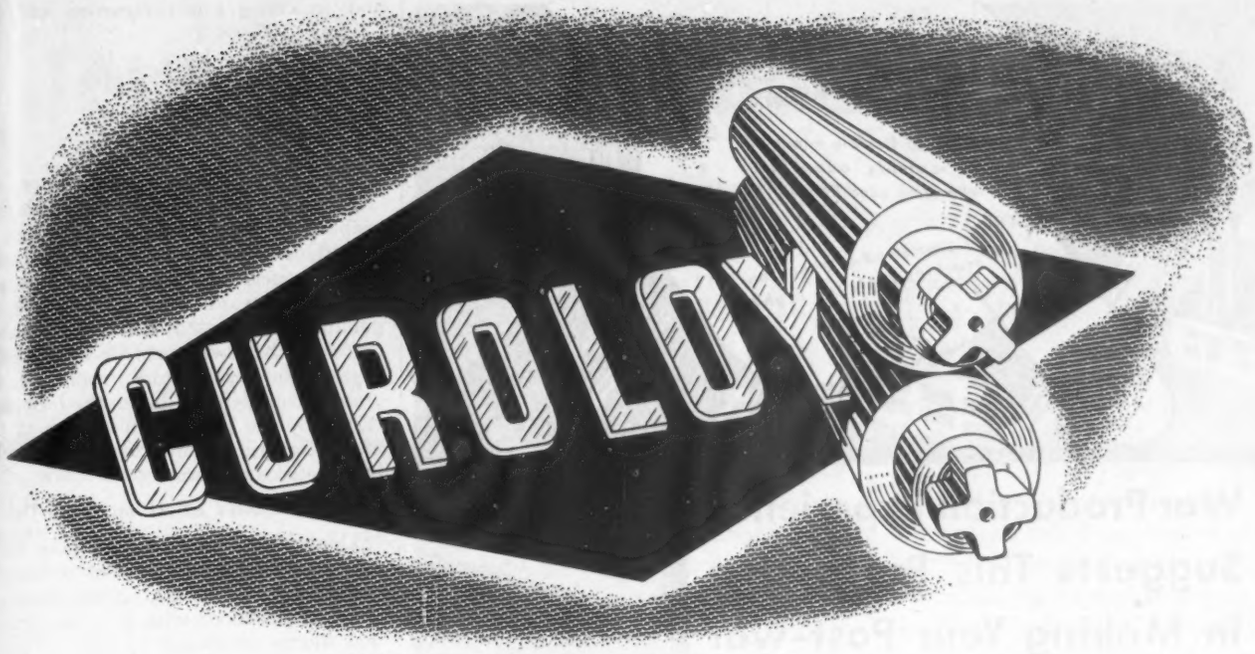
There follows a more pictorial representation of a possible mechanism for the formation and prevention of metal build-up on tools which is a logical development of lubrication theory. It may dispel some doubts concerning the action of drawing lubricants. In addition, it may lay the groundwork for a quantitative approach to the problem of drawing lubrication if numerical values could be determined for various lubrication factors.

Let us consider a hypothetical case in which there is used a die with a highly polished surface, a given area of which is composed of 10^{23} atoms. Inasmuch as the surface would consist of peaks and valleys, possibly 10^{16} atoms are at the effective surface. If the surface of the die and work were perfectly clean, there would form 10^{16} welds if the surfaces were pressed together. However, perfectly clean surfaces are almost impossible to obtain, so let us assume that "shop clean" surfaces are available and only 10^{11} atoms are able to weld because of the protection afforded by miscellaneous contaminants such as oxide, water vapor, dirt, etc. The die being used may be considered to be quite hard and of a dissimilar metal to the work (sintered carbide) so that only 10^{7} atoms have a tendency to weld.

Consider the individual weld sketched in Fig. 4. Following the formation of this weld, there is a tearing of metal in the vicinity of the weld which may be conservatively estimated as causing the build-up of three atoms from the work on the original weld. Each of the atoms picked up can weld except for the provision of surface contamination or lubrication to prevent this. Even though no visible lubricant is applied, a certain amount of surface contaminant such as oxide, or water vapor, etc., will be formed by the action of the atmosphere. This possibly would prevent further welding of one of the three atoms of built-up metal. The other two atoms, however, would each pluck three atoms of metal from the next piece worked and the size of the welded area would increase in geometric progression. This increasing rate of enlargement of the built-up area continues in the subdivided range but at some point the magnitude of the built-up area passes the zone of visibility, which is in the order of 10^{16} atoms or something like 0.00006-gram. Fig. 4 indicates the possibilities for a prodigious increase ultimately carried into the visual range.

The sum of a geometric progression is equal to $S = a\,\frac{(r^n - 1)}{(r - 1)}$ If $a = 1$ and each weld results in the removal of 2 atoms so that $r = 2$ and n = number of progressions, the number of pieces drawn in this application, then $S = 1\,\frac{(2n - 1)}{(1)}$

For S, the number of welded atoms, to equal 10^{16} atoms for minimum visibility,



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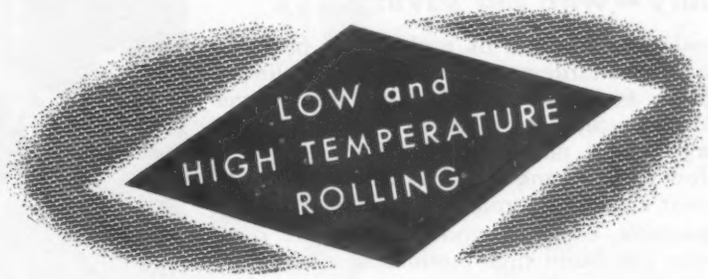

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Delta's modern conception of tool design provides you with a safe, versatile approach to the uncertainties that lie ahead. For many operations it eliminates the delay and heavy capital risk involved in buying costly, cumbersome, special machines of limited usefulness that are slow to build and that may become obsolete with the next change in product design.

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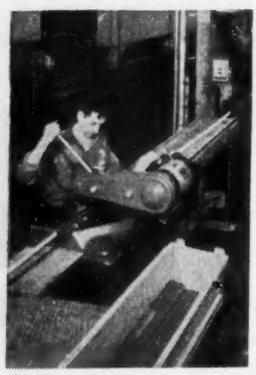
You cut down your fixed investment in machine tools . . . retain more liquid working capital for other post-war needs. Delta's savings in cost, weight, and space are not obtained at the expense of quality. They result from advanced design and from quantity production of standard models.

Save money — stay adaptable. Let low-cost Delta-Milwaukee Machine Tools and the ingenuity of your engineers form a workable combination to solve many of your production problems.



Above: A typical example of the convenient money-saving applications of Delta-Milwaukee Machine Tools in many plants. In the dry extrusion process of making thermal plastics for decorative and structural shapes, it is a simple matter to incorporate a Delta Cut-Off Machine in the production line, so that the continuous strip material can be cut to proper lengths as it comes from the forming machine.

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Delta's 76-page Blue Book provides 140 case histories of valuable war production experience that may suggest similar money-saving peacetime applications in your plant. Also available is a catalog of low-cost Delta-Milwaukee Machine Tools. Request both, using coupon below.

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Please send me my free copies of Delta's 76-page Blue Book and catalog of low-cost machine tools.

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Position.....

Company.....

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City.....(.....) State.....

and neglecting 1 in comparison with 2^n,

$$10^{16} = 2^n$$
$$n = \log 2 = 16$$
$$.3n = 16$$
$$n = \frac{16}{.3}$$
$$= 53 \text{ pieces}$$

Actually, under practical conditions visible pickup might occur in the first or second or third piece, assuming a very difficult operation, due to the increased tendency toward welding as the temperature is increased, and the likelihood that more than two atoms are welded each time. The temperature would be increased considerably due to the heat generated by the plastic deformation of the metal and due to breaking of the welds by the force performing the draw.

Lubrication's Effect on Build-Up

Under the above extremely poor lubricating conditions, the rate of welding is high and metal buildup on dies grows to visible proportions with extreme rapidity and shortly afterwards to such an extent that large pieces of metal are welding and being displaced. This results in the work being galled seriously and torn.

Let us now consider some cases in which various lubricants, used commercially are applied, other conditions being similar. First, let us consider soap lubrication, which is adequate for cases in which the tendency for welding is at a low level. A single atom from the die welds with the work and plucks three atoms of the softer metal from this. Because of surface contamination by water vapor, oxide, etc., only two of the three atoms can weld as heretofore. However, now we have a liquid acting as a vehicle for fatty acids which form an adsorbed layer on the welded region which is fairly resistant to shearing stresses so that it tends to prevent welding. While the polar film can sustain shearing stresses to a greater extent than hydrocarbons (mineral oil) the film is susceptible to rupture to a certain extent. This is in accord with the results of carefully controlled experiments on boundary lubrication in which it has been found that some rupture of the lubricating film, with consequent welding, occurs even when the best known boundary lubricants are employed[33].

Let us assume that film in this specific region is broken once for each five pieces drawn. This results in a weld and this process is continuous—an average of five pieces may be drawn before temperatures and pressure cause displacement of a portion of the film to such an extent that one weld is allowed.

Utilizing the formula for geometric progressions, as before, there is obtained:

$$S = \frac{(2^{\frac{n}{5}} - 1)}{(2 - 1)}$$

For S to equal 10^{16}, n would be:

$$10^{16} = \frac{(2^{\frac{n}{5}} - 1) \text{ neglecting } -1}{(2 - 1)}$$

Jonesy Learns about Genex C

JONESY, our welding super, was sitting as pretty as any guy with a mug like his can sit. No beefs from the customers; no screams from the Lords of Creation in the front office. Our jobs were mostly downhand, "hot-rod" stuff, calling for Murex F or FHP electrodes. In fact, call for anything other than Murex on those jobs, and Jonesy would roar like a bull.

Then in comes this new job, #2XW31. I'm Jonesy's assistant; we gave the drawings and specs a careful once-over. To me it looked like a job for Genex C.

"Right much carbon in that steel," I mentioned. "Calls for a colder arc than the run of our jobs here, so we won't pick up lots of carbon and get a brittle weld. I'd say we want a 6012 electrode. Okay?"

"Okay," Jonesy agreed, and I picked up the phone and put in a call for Murex.

"Hey," Jonesy yelled, "Nix." He grabbed the phone out of my hand. "Look," he roared, "Murex may make the best downhand hot rods money can buy, but I don't know about their others. Call some other outfit."

I argued as long as you can with a boss like Jonesy. I tried to tell him that Murex has two of the best 6012 rods made (Genex and Genex C)—plus about 30 other electrodes, each one as good in its place as their famous hot rods. No soap, though; Jonesy knew better.

So I called up some other outfit—several in fact—and we tried their 6012 rods. Unit after unit of Job #2XW31 came off the jigs cracked in the weld. Too much heat and pickup of carbon. Jonesy raved for a week, then finally broke down.

"Say," he asked me, sort of sheepish, "how about calling Murex?"

I called Murex and they sent us a batch of their Genex C. Job #2XW31 was off the floor in two days—and no job's licked us since, thanks to Murex.

METAL & THERMIT CORPORATION

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PREVOST MACHINE PRODUCTS
19301 W. DAVISON
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"CONTROLLED UNIFORM ACCURACY"

$$16 = \frac{n}{5} \log 2$$

$$\frac{.3n}{5} = 16$$

$$n = \frac{16 \times 5}{.3} = 266$$

or 266 pieces could be drawn before visible pickup.

As before, this would be reduced by temperature effects, but more slowly than in the previous example because the reduction in friction when polar films are adsorbed would result in formation of less heat than when these films are absent.

Effect the superposition of various weld preventive factors such as the use of appropriate fillers; of dissimilar metal coatings; of sulphur in the lubricant to enable the formation of stable metal sulphides; of plastic solid films such as soap or wax, etc., would be to increase the magnitude of the number by which n is divided since the number of welds formed would be reduced more and more. However, in each case the formation of visible buildup would be an abrupt affair occurring within a small number of pieces drawn. When good lubrication is attained, buildup will become visible abruptly, but will become worse much more slowly than under conditions of poor lubrication.

Tendency To Weld Persists

Let us now consider a case in which all of these lubrication factors are employed. (It might be pointed out that the milder the operation, the fewer of these factors would be required for a desired result—tool life; but even in these cases, the use of all factors would cause improvement in tool life by reducing the number of welds. However, a practical limit is indicated by factors of expense and the occurrence of mechanical or accidental failures).

Under this set of conditions the tendency toward welding would be greatly lowered, but still would be present. Any or all of these factors may be in operation to prevent welding at a particular time but the tendency toward welding is, let us say, one weld at this particular region for each 3000 pieces drawn. Thus, to reach the zone of visibility, or 10^{16} atoms:

$$10^{16} = 2^{\frac{n}{3000}} - 1$$

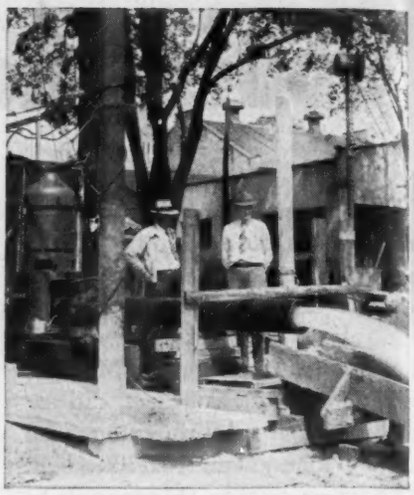
$$16 = \frac{n}{3000} \log 2$$

$$48000 = n \log 2$$

$$\frac{48000}{.3} = n$$

$$n = 160{,}000 \text{ pieces.}$$

Although only one weld would occur in 3000 pieces at this region, and the buildup would not be visible until 160,000 pieces have passed over this spot, there are 10^7 other spots on the die where this



"Good Makings"
Make a Good Water System

You can always put your utmost confidence in a Layne Well Water System. Everything from the method used in drilling and finishing the well to the design, manufacture and installation of the pump can be trusted for highest efficiency, most durable quality and the longest life of service.

Shown above is a system recently completed for a major food manufacturer. Running true to Layne form, this system out performs its guarantee, producing nearly twice as much water as other wells in the same locality. This manufacturer knew what to expect. He already owns four other Layne Well Water Systems, all of which have always given outstanding service. He knows how little it costs to operate Layne Systems, how much water these systems produce and how small the upkeep cost.

Layne is already in postwar work. Many postwar installations are now being made. Others will soon be started. All will be of the world famous Layne quality.

If you need more water, either from entirely new wells and pumps, or from efficiently modernized old ones, write, wire or phone for the planning and estimating services of a Layne engineer. No obligation. Address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

LAYNE PUMPS — *fulfill every need for producing large quantities of water at low cost from wells, streams, mines or reservoirs. Send for literature.*

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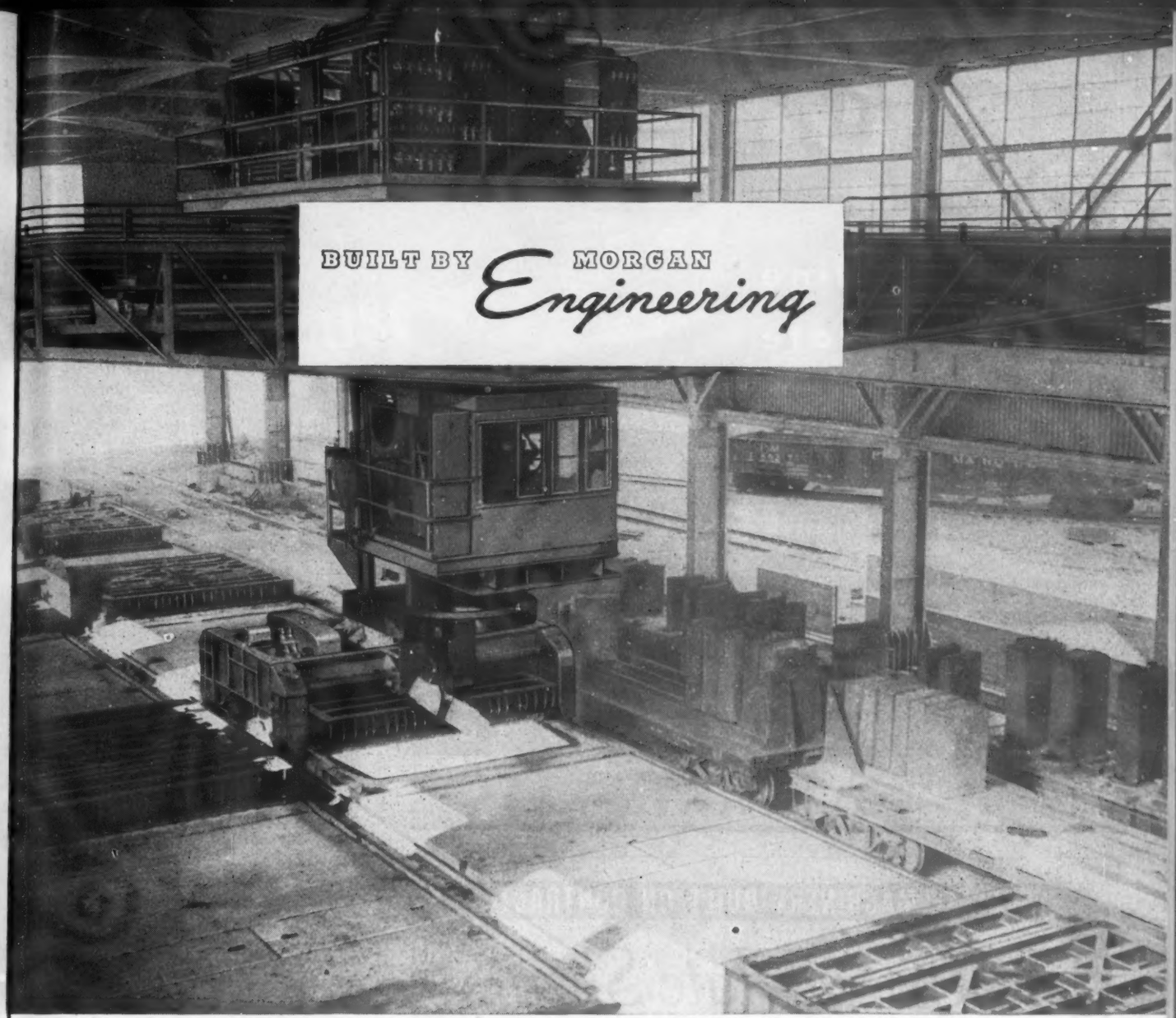
WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS



MORGAN 10-TON SOAKING PIT CRANE

HANDLING SLAB INGOTS IN A WEST COAST STEEL PLANT

Illustrated is a Morgan 10-Ton, 7-Motor, 81′ 0″ Span Soaking Pit Crane with 15-Ton Auxiliary Hoist. Morgan superiority of design and construction is built into every part to insure many years of profitable service. It is equipped with fabricated welded trolley and bridge trucks and anti-friction bearings throughout. Trolley is of the worm operated type which simplifies the construction and lowers the cost of maintenance.

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GIBRALTAR GASOLINE CONCENTRATE used in the proportion of four ounces to each ten gallons of gasoline will solve the problem of overhead lubrication in gasoline engines. It lives through the explosion and functions as a lubricant for those parts not otherwise reached and deposits its protective film over the combustion chamber. It seasons the metal, reduces the amount of friction on the bearing surfaces of the valves and prevents carbon from adhering to them.

When you use GIBRALTAR GASOLINE CONCENTRATE it is not necessary to grind the valves as it prevents hard carbon from adhering. The savings from the use of the concentrate will at all times more than offset its small cost, and will also prolong the life of your motor, giving added power and efficiency.

GIBRALTAR GASOLINE CONCENTRATE is manufactured by the makers of GIBRALTAR OIL and DIESEL FUEL OIL CONCENTRATE. Write for details.

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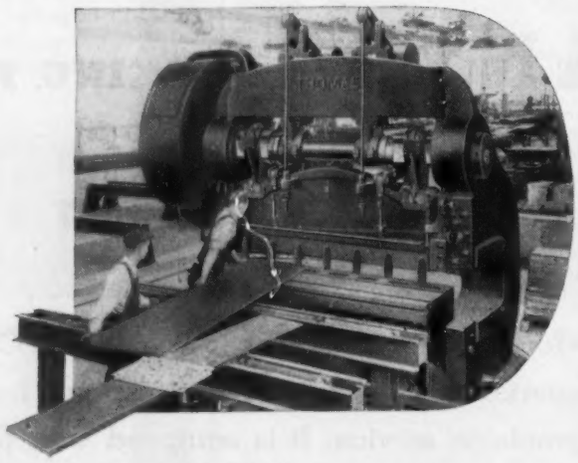
PUNCHING AND SHEARING MACHINERY

THOMAS *Plate Shears*



These Thomas Plate Shears are built in sizes to meet the varied requirements of Industry. Capacities up to 3" in thicknesses, widths to 14 feet or more. Thomas Shears are rugged and dependable, requiring but a minimum of maintenance.

Write for Bulletin 126.

THOMAS No. 4

MACHINE MANUFACTURING COMPANY

PITTSBURGH, PA.

process could occur. Although visual buildup may appear at one region, there probably are many thousands of other regions which have subvisual buildup. These regions would become visible as additional pieces are drawn.

Before leaving this hypothesis, it should again be emphasized that it is mainly intended as a thought-provoking concept. However, it does appear plausible and may provide a better understanding of deep drawing lubrication.

Excessive Lubricant Friction

The greatest reduction in friction usually is obtained by reduction of welding but, in addition, the friction due to the deformation of the lubricant itself sometimes becomes important. Ordinarily, the power consumption reduction due to reduced lubricant friction is negligible, but in cases in which an unwarranted increase of power consumption by 20 per cent occurs, this is a factor to be considered. However, other effects attendant upon increased lubricant friction may become very important. These are excessive heat formation, flaking of nonductile deposits (reactivity wear), strain on equipment and change in localized flow of the metal.

Certain nonductile deposits obtained by reaction with the lubricant during the draw or applied as pre-treatments cause excessive lubricant friction. Examples of these are heavy oxide, sulphide, "sulphur oxide," and phosphate deposits. These are frequently efficient weld preventives and sometimes can be effectively used in conjunction with polar lubricants so as to minimize lubricant friction, although this is still high. Fillers of the pulverizing types frequently increase lubricant friction to a moderate extent. Deposits of ductile metals and of solid low-melting-point lubricants such as soaps or waxes generally cause low lubricant friction, the latter to the greatest extent because of the approach to fluid lubrication conditions.

(*Continued next week*)

References

[43]Thompson, J.: General Discussion on Lubrication, III, ASME, New York, 1938, p. 153.

[44]Bonzel, M.: "The Drawing of Steel Wire" (Translation), Engineer's Book Shop, New York, 1935.

[45]Bowden, F. P., and Ridler, K. E. W.: Proceedings Royal Soc., A-154-640, 1936.

[46]Tabor, D.: Nature, 147-610, 1941.

[47]Heyer, R. H.: "Engineering Physical Metallurgy", D. Van Nostrand, 1939.

[48]Jevons, J. D.: "The Metallurgy of Deep Drawing and Pressing", Wiley & Sons, 1940.

[49]Swift, H. W.: The Iron Age, June, 1940.

[50]Birdsall, G. W.: STEEL, June 14, 1943, p. 100.

[51]Ericson, V. H.: Mechanical Engineering, 66-107, 1944.

[52]Goodacre, R.: "General Discussion on Lubrication," III—p. 68, ASME, New York, 1938.

[53]Williams, R. C.: Ind. and Eng. Chem., 27-64 (1935).

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The first welded steel bed to be used in a motive power unit in the United States was fabricated in 1934 by Lukenweld Inc., 237 Lukens building, Coatesville, Pa., for the Zephyr, first diesel-powered streamlined train of the Chicago, Burlington & Quincy railroad.

what users discover about INTERNATIONAL electrodes

Leading *producers* of electric furnace steels have been consistent users of INTERNATIONAL Graphite Electrodes for 15 years. So have principal electric furnace *manufacturers.* Neither could afford to rely on them for quality steel production if they were not confident that INTERNATIONAL electrodes fully measure up to every important standard by which acceptable electrodes are judged. Users have proved this fact to their own satisfaction in the severest test of all—in actual furnace operation under a wide range of production requirements. Thus, they have found that INTERNATIONAL electrodes can be depended upon to have all the physical, electrical and chemical properties essential to maximum service, at minimum cost per ton of production.

Present users have discovered, too, that INTERNATIONAL stands for good service; offers helpful recommendations for applying and using electrodes most efficiently. Behind INTERNATIONAL development, manufacturing, and service facilities is much valuable experience that is yours for the asking. Write us for additional details.

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For shock loading or where very heavy loads must be handled on Roller Conveyer, Mathews Spring-Mounted construction should be considered. Spring-Mounted Roller Conveyer is made in three styles, and is establishing service records in heavy industries all over the United States and Canada. Your Mathews Field Engineer can explain how it works and why the Mathews design is superior to other available types of Spring-Mounted Roller Conveyer. He can tell you how its application has minimized the costly maintenance which is usually necessary on Roller Conveyer used under very severe conditions. You will readily understand how the principle of pre-compression protects the bearings and axles of the rollers, yet, at the same time, prevents any bouncing action from taking place. Descriptive literature is available on request.

Mathews Conveyer Company
ELLWOOD CITY, PENNSYLVANIA

Metal Peening

(*Concluded from Page* 112)

the past several years, and the company has returned to the use of chilled iron shot. It seems possible to produce steel shot, but the cost would undoubtedly be much higher than that for white iron because of the higher temperature required to produce steel of sufficient fluidity for shotting. Steel shot of the type used as burnishing balls and ball bearings might be considered, but it is thought that the cost would be prohibitive.

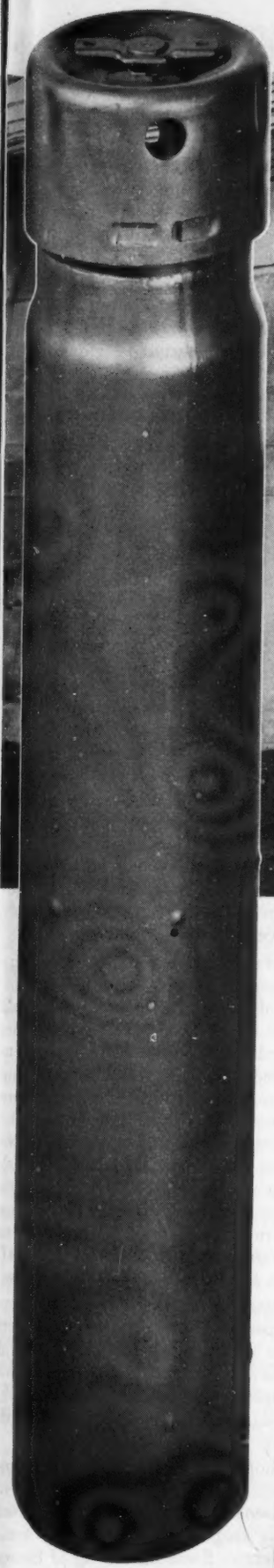
Definite quotations on such shot are not available, but one estimate on the price of burnishing balls in the size of 1/16 to 3/32-inch diameter indicated prices of the order of 50 to 75 cents per pound, i. e., $1000 to $1500 per ton. Doubless the price could be reduced on large quantity production, but it still would seem to be prohibitive for most shot peening applications. Finally, even steel shot or balls naturally show a loss in resistance to fracture as the hardness is increased.

Spotlight Simplifies Striking of Welding Arcs

A new spotlight, manufactured by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is said to overcome the fact that objects under normal illumination cannot be distinguished through the smoked glass window of an arc welder's mask before he strikes his arc, although the arc is sufficiently intense to provide ample light after welding begins. It is claimed to remove the guesswork of striking the arc in the proper place, casting on the work area a light twice as bright as the brightest sunlight on a seashore in summertime. This light is intense enough for the welder to see the spot to be welded even through his mask filter. A footswitch makes it possible to turn the light on for an instant to locate the spot where the arc should be struck.

This bright light beam is produced without creating much heat, an important point to a welder working in a small welding booth in summer. By using a sealed-beam type of lamp, 10,000 foot-candles are thrown on the work three feet from the lamp with an expenditure of only 32 watts. It is expected that two lamps will be used to provide an overlapping pattern, totaling 20,000 foot-candles. Because the light may be concentrated better from a low-voltage lamp, the 110-volt supply is reduced to 6 to 8 volts by a small transformer built into the back of the reflector. A shield with blackened interior extends some distance in front of the lamp to prevent stray light from causing glare to a neighboring welder.

These lamps may be clamped to an upright or arranged on a horizontal bar, horizontal and vertical adjustments providing accurate placement of the beam spot. Still under development in the company's laboratory, this lamp is not available commercially.



Steel container at left costs $3.50, while fibre container which it replaces costs $6.00 with crating. Below fibre containers are shown in use at Bougainville.

Sure Death Stays Sure in a Steel Container

FROM the beginning of the war ammunition for American cannon was delivered in fibre containers.

But the fibre can't keep out moisture indefinitely. In the Pacific areas thousands of shells required renovation because threads on shells and fuses were corroded.

Now Youngstown steel sheets are being used in thousands of steel shell containers, similar to the 105 mm. mortar shell container shown here.

These steel containers are replacing fibre containers in areas where high humidity penetrates the fibre. They are also used in amphibious operations where shells are unloaded from shipboard into the water, and subsequently are picked up at low tide.

Steel containers not only are water-tight and air tight, but also cost less than fibre containers with necessary crating. The Army now uses them for seven different sizes of ammunition.

This war-time use of steel containers emphasizes the many advantages of Youngstown sheet for peacetime packaging. Thousands of manufacturers can use Youngstown sheet steel to give their products absolute protection in low-cost, long-lived, modern containers.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

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Time saving procedures, using Coleman Spectrophotometers* are shown in the new and revised "Curvesand References". Molybdenum, phosphorus and manganese references are also given.

One user reports "... *copper, nickel and molybdenum determinations are done in 20 minutes using the UNIVERSAL, as compared to 90 min. formerly required.*"

Write for Bulletin MP3 and ask also for detailed procedure on the new copper and nickel method!

**An Authorized Coleman Distributor*

Turning one knob permits selection of any color light band required ... Coleman Universal Spectrophotometer, at $340.00 — replaces visual and filter colorimeters.

S4-45

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GRANT GEAR WORKS COR. SECOND & B STS. BOSTON, MASSACHUSETTS

Making Rock Drills

(*Continued from Page* 118)

0.0005-inch. The two diameters were turned, a 45-degree bevel and a face width flange (0.004-inch) were accomplished on two spindles in one operation using carbide tools. Speed was 800 revolutions per minte with 4-inch feed per minute.

A battery of hones is part of the grinding department equipment which includes Blanchards and external, internal, and centerless grinders. Hones were required because of hydraulic parts and cylinders which constitute a significant part of war production here.

The bench department accomplishes all burring, sanding, swedging of water tubes, surface grinding, rough grinding of snags from castings, removing flash from forgings, polishing all air-feed cylinders of which there is a great volume of work to accommodate rock drill production, lapping of all centers before grinding.

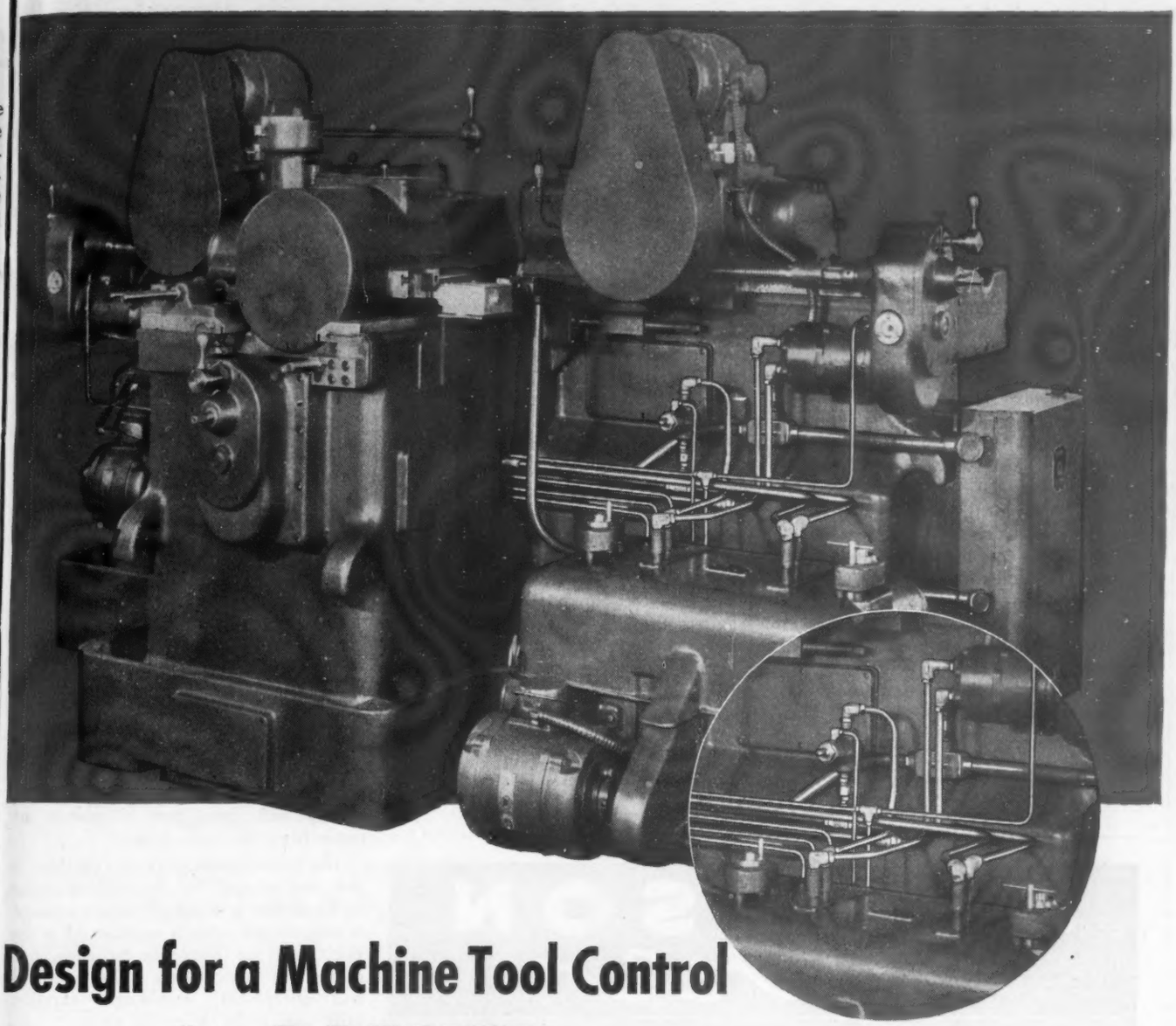
Equipment Is Complete

The die sink department sinks and maintains the heavy runs on all die work. It has such equipment as planers, lathes, shapers, die sink machines and hand apparatus. The purpose is to indicate the completeness of equipment in all departments. This undoubtedly arises from the fact that Denver stands alone from other industrial centers and contributes to the self-contained sufficiency of this well equipped plant.

The shop plating department is very modern and complete. Chromium, copper, cadmium and zinc plating as well as aluminum anodyzing are regularly accomplished. Chromium plate is extensively used for repair in building up worn gages and tools. Plug gages are plated from 0.01 to 0.05-inch on the surface, ground to size and lapped. Hammers, taps and drills are given a flash chromium plating of 0.0001-inch or less every time plating wears off. This is not done to protect the tool, but rather to keep it from galling or picking up metal. The plate acts as a lubricant in a sense.

Some parts are plated to prevent corrosion, particularly those for export since the company's market is world wide. The department also handles all Magnafluxing which is used extensively by the shop, and on all aircraft work done here.

The shop's welding department employs both electric and oxyacetylene in large volume. Acetylene is largely used for cutting shapes automatically by template. Selective flame hardening of bosses and drums is standard practice. All jigs and fixtures are of arc-welded construction. Welding is likewise used to fabricate end plates for muckers, drums for hoists, and welding cylinders. Parts are forged for assembly by welding. The



Design for a Machine Tool Control by PARKER

Consider this as an example of the many types of machine tools that are designed to use tubing systems for hydraulic control and for lubrication.

When a machine tool tubing installation is designed in conformance with sound Fluid Power Engineering principles it will:

(1) Allow the closest practicable approach to perfect streamline flow which in turn will reduce to a minimum the capacity and pressure requirements on the power source and give a better response to control throughout the entire system.

(2) Permit the efficient use of available space . . . no matter how cramped this space may be . . . and still provide a system that allows unobstructed service and maintenance on all component units of the system.

(3) Reduce the number of joints and connections to a minimum . . . each one tight, leakproof and able to withstand excessive abuse, vibration and pressure.

Parker valves, fittings and fabricated tubing—plus Parker Engineering—will give you a simple, neat installation, easy to service, free from troubles, efficient and economical.

Whatever you make—motor vehicles, earth-movers, presses, aircraft, refrigeration or process equipment, ask a Parker engineer for recommendations based on this "know-how". Write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio. Booklet on request.

THE
PARKER
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CLEVELAND • LOS ANGELES
FLUID POWER ENGINEERING

department has expanded four times in the past 5 years.

The heat-treat department takes in the book, with the exception of nitriding. Proper heat treatment is of crucial importance in the production of rock drills. Many special treatments have been originated which the company is rightfully hesitant to make known. Its techniques in carburizing, high speed hardening, salt and lead baths are particularly noteworthy.

The forging equipment of the shop consists of one 6000-pound Erie drop forge, one 1000-pound Erie drop forge, one 2000-pound Billings & Spencer board drop, one 2-inch National forging machine, and two Gardner-Denver Model DS-6 drill sharpeners. This equipment is manned by 12 operators and helpers. The dies are made and repaired by eight mechanics in the die sinking department. In the past three years, these men and machines have produced a total of 455,000 forgings for Army and Navy aircraft, in addition to forgings for regular production of rock drills and spare parts for these drills.

Many of the aircraft forgings required considerable development work to produce the thin section forgings to specification and sufficiently sound to pass Magnaflux inspection. The percentage of scrap in this production amounts to approximately 4 per cent. Due to the constant operation of these hammers, breakage was unavoidable. In September 1942, the anvil for the 6000-pound steam drop, a 60-ton steel casting, failed by splitting vertically through the center.

In order to continue operation, two 6½-inch round steel bolts were employed with two 6 x 10-inch cross bars to securely bolt the two broken halves of the base together, which permitted continued operation of the hammer. In fact, the repair is still serving after more than 1½ years of double shift operation. The same type of repair was necessary on the 2000-pound board drop and is still in operation following approximately a year of service.

The weight of the aircraft forgings in particular varied from a few ounces up to forgings weighing more than 40 pounds. Some of the forgings required two sets of dies for their completion, due to the limited facilities available. During this period many innovations were applied in the design, selection of material and treatment of repair parts going into the hammer in an effort to lengthen the service life of the forging tools. The same was true of die design wherein special breakdowns and modification in preparing the stock was employed to produce sound forgings with a minimum of strain to the equipment.

C. E. Lucking, general plant superintendent, and Stanley Mitick, his assistant, clearly reflected the policy that has won the company renown by their enthused emphasis upon the operations of the centralized inspection department, a company feature since its beginning. Every piece is 100 per cent inspected; in raw material, processing and finish.

After machining, the 100 per cent central inspection is made and the part is stamped with appropriate symbols, and sent to heat treat or finished parts stock. Returned from heat treat, it is again so inspected, and from hardness approval it is sent to grinding to be finally returned for 100 per cent dimension and defect inspection.

Parts Are Interchangeable

Result of this care is that there are no selective assemblies in the company's line. Every part is interchangeable all over the world. Valve and hammer parts for the rock drill, some with tolerances of 0.00025-inch, are picked from regular finish inventory and sent everywhere with assurance of their fit.

The very large assembly department is divided into three activities: (1) rock drills, (2) muckers, hoists, drill sharpeners and heavy equipment, (3) aircraft hydraulic units for bomb, nose wheel and landing gears on such airframe assemblies as the Douglas A-20 and A-26, the Lockheed P-38. As further evidence of G-D capabilities in machining, assembly and spare part shipments are made from the same bins.

The organization employs less than 10 per cent women. Its absenteeism record of 3 per cent is decidedly below average. A cooperative store is maintained in the plant, serving employes in such purchases as tobacco, drugs and soaps, paint and equipment, automotive supplies, gifts and tools. A credit union is also established for employe loans at a small fraction of what such loans cost on the outside. This agency handles such other features as war bonds and automobile insurance.

This article would not be complete without particular mention of the excellent housekeeping. The grounds are in perfect order, hedges and vines excellently trimmed, painted surfaces are newly white. A portable "steam jenny" regularly washes machinery, aisle trappings and windows. Workers are careful of chips, shavings and litter. The company has long been known for insistence upon good housekeeping, for in its opinion, "good housekeeping is perhaps the greatest single instrument of morale, self-discipline and pride among our craftsmen. We get fine work precision because we are not slovenly".

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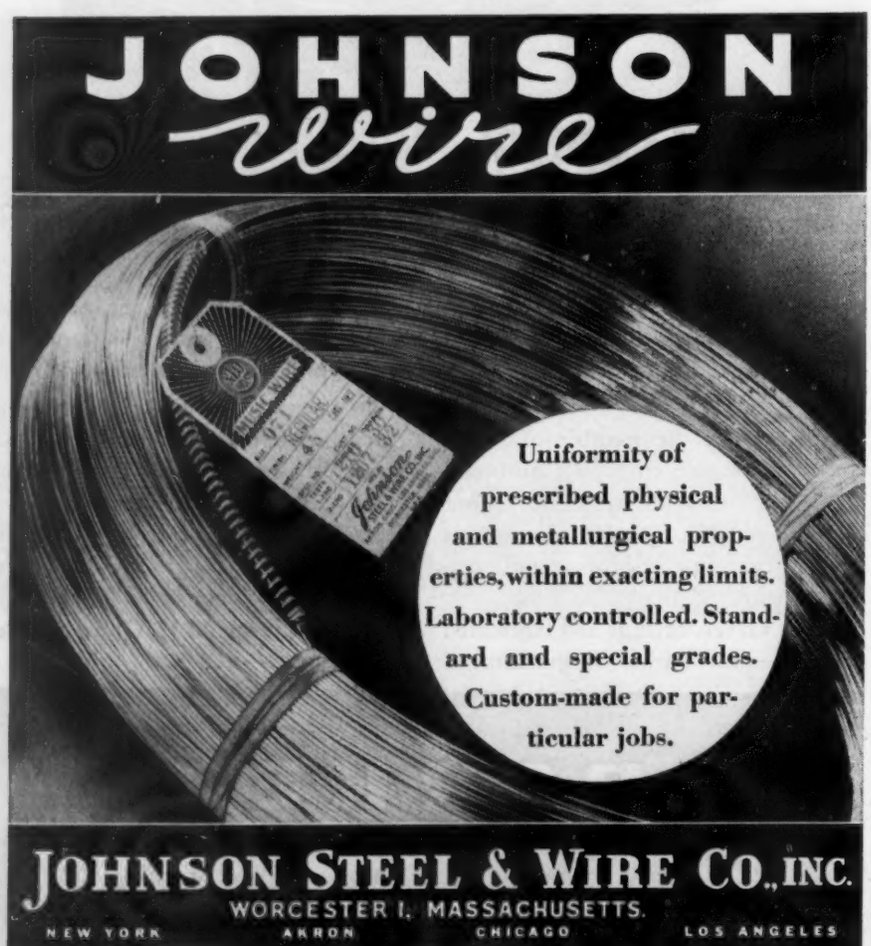
Three new pamphlets describe diamond wheel markings manufactured by Norton Co., Worcester 6, Mass. They list typical conversions from previous to new markings and other helpful information.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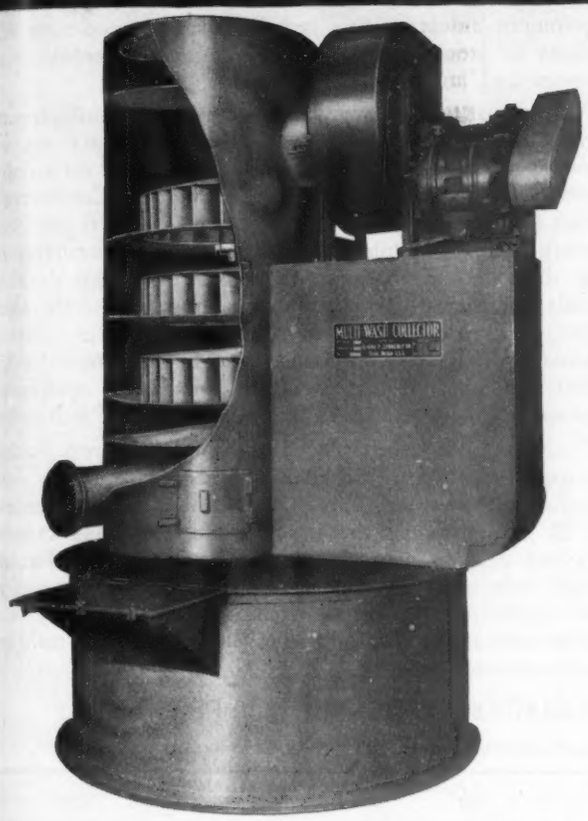

Schneible Type "EC" Multi-Wash Dust and Fume Collector

Here is a highly efficient, completely portable streamlined unit for the collection of dust produced by isolated operations or machines that are not connected to a central dust collecting system. It is ideally adapted to dust-producing operations in plants not having a central dust collector, or where movement or shifting of equipment makes a central system undesirable.

In one portable, self-contained unit are combined all the elements of a larger Schneible Multi-Wash System: a three and one-half stage Multi-Wash Collector, a sludge settling tank, a recirculating pump, a suction fan and an after filter. The Type "EC" Multi-Wash Dust Collector operates with the same high efficiency characteristic of all Schneible dust and fume collectors.

Any grinding, sawing, milling, mixing or other dust producing operation can be effectively handled by the use of a Schneible "EC" Dust Collector.

Send for new Bulletin 145.

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Steady Service— Long Life— From Portable Tools

Foremost makers* recommend the use of NON-FLUID OIL after determining by prolonged service tests that it helped their tools perform most efficiently over long periods.

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TRADE MARK REGISTERED
NON-FLUID OIL
IN U.S. PAT. OFFICE & FOREIGN COUNTRIES

MODERN STEEL MILL LUBRICANT

Better Lubrication at Less Cost per Month

THE BUSINESS TREND

Sharp Gains in Critical Programs Scheduled

INCREASED demands are being made on our productive resources at a time when the continuing drain on manpower and materials makes it steadily more difficult to maintain even the current production level. Recent actions to stem the drain on manpower from the raw-material-producing industries reflect a recognition of the seriousness of the problem by all the war agencies.

War Production Board and the military agencies are now jointly studying the munitions programs to determine where adjustments can be made in military and civilian requirements so that enough manpower, materials and facilities are left to satisfy minimum needs of the war-supporting programs.

PRODUCTION GOALS—Projected production schedules call for further increases—ranging from modest proportions up to 290 per cent—in output of the critical items. By December production of Navy rockets is scheduled to be 290 per cent over the February output; critical aircraft production schedules call for 134 per cent increase by that time. Production of critical ammunition is expected to be about 83 per cent above the February production rate by next October, and artillery output is scheduled to increase 78 per cent by July. These goals are expected to be extremely difficult to achieve due to the manpower shortage, losses of production in shifting to new and more difficult products required by the military, and the critical low level of many inventory reserves after three and a half years of war production.

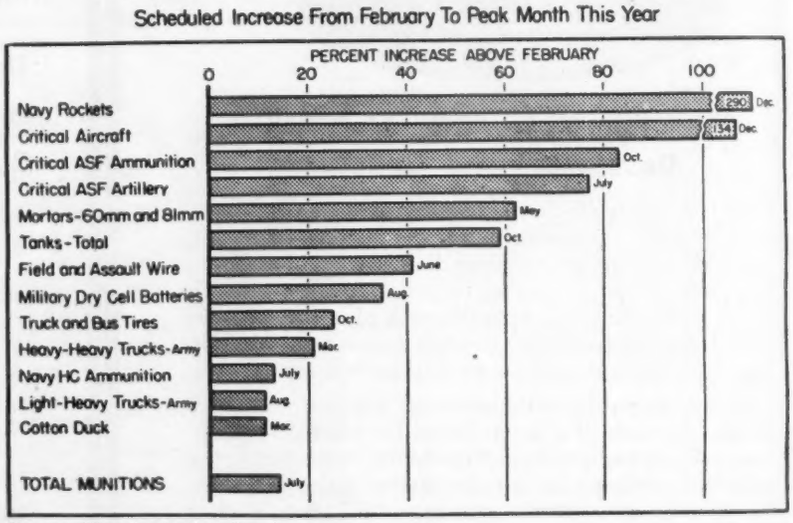
INVENTORIES—Further liquidation of manufacturers' inventories occurred throughout January, resulting in a decline of $160 million to an estimated $16.6 billion, the lowest point since early 1942. Although most of the steady liquidation of inventories, which has been in progress for nearly two years, has been accounted for by inventory reductions of durable goods manufacturers, the total stocks held by these industries at the end of January was practically unchanged from the preceding month. Within this group, the further curtailment of inventories in the iron and steel, and transportation equipment industries was largely offset by moderate additions to stocks made by the nonferrous metals, machinery and automobile industries.

In contrast to the downward tendency in manufacturers' inventories the past two years, shipments have moved upward reaching an all-time peak in December on a daily average basis. However, the Department of Commerce's index for durable goods shipments was down 6 per cent during January, while virtually no change occurred in the shipment of nondurable goods. Only two durable goods industries—lumber and machinery (except electrical)—increased their daily average deliveries during January. Sharp reductions occurred in the January shipments in the iron and steel, transportation equipment (except automobiles), and electrical machinery industries.

Value of new orders placed with manufacturers during January exceeded all previous records, rising 8 per cent above the December volume and representing an increase of 25 per cent over the total for the like 1944 month. Marked gain in new business reported by the durable goods industries accounted for the sharp January rise in new orders, and reflected renewed expansion of war goods contracting resulting from the alteration in military procurement plans.

1945 PRODUCTION GOALS—CRITICAL PROGRAMS

Scheduled Increase From February To Peak Month This Year



Source: War Production Board.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	97	95	96	98.5
Electric Power Distributed (million kilowatt hours)	4,402	4,398	4,474	4,409
Bituminous Coal Production (daily av.—1000 tons)	1,992	1,838	1,919	2,012
Petroleum Production (daily av.—1000 bbls.)	4,782	4,774	4,778	4,385
Construction Volume (ENR—unit $1,000,000)	$23.6	$40.8	$16.3	$32.9
Automobile and Truck Output (Ward's—number units)	20,480	20,505	21,015	19,335†

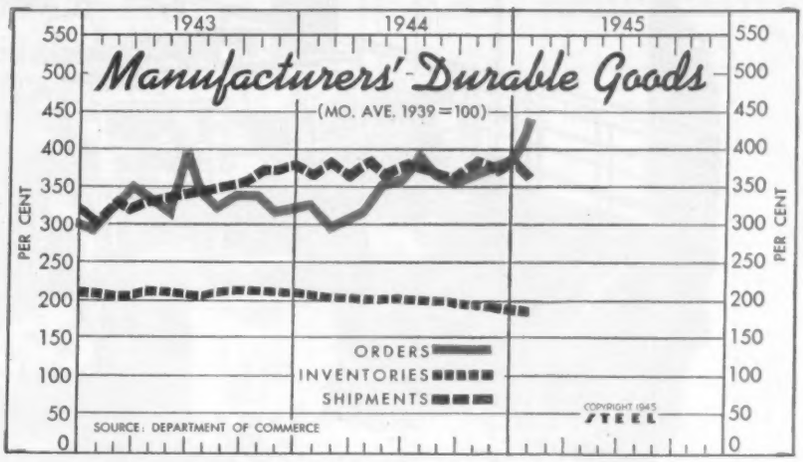
*Dates on request. †Revised.

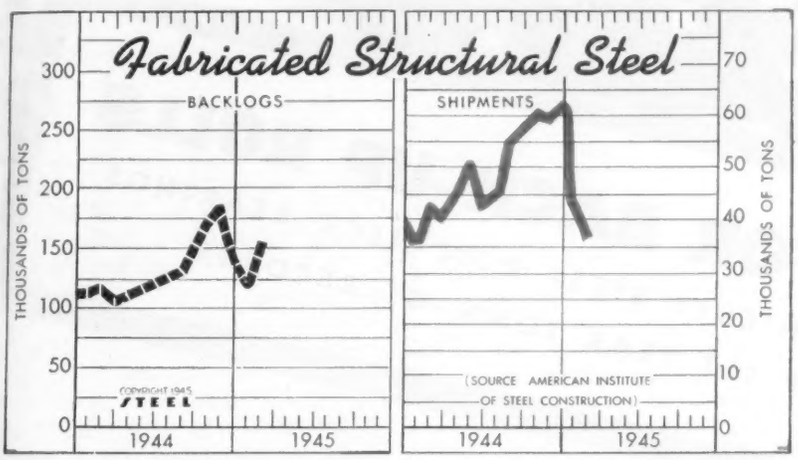
TRADE				
Freight Carloadings (unit—1000 cars)	820†	816	771	779
Business Failures (Dun & Bradstreet, number)	14	16	14	30
Money in Circulation (in millions of dollars)‡	$25,836	$25,881*	$25,652	$20,934
Department Store Sales (change from like week a year ago)‡	+28%	+19%	+21%	+11%

†Preliminary. ‡Federal Reserve Board. *Revised.

Index of Manufacturers' Durable Goods (Mo. Ave. 1939=100)

	—Orders—		Shipments		Inventories	
	1945	1944	1945	1944	1945	1944
Jan.	438	332	366	364	192	212
Feb.	...	294	...	384	...	209
Mar.	...	310	...	377	...	207
Apr.	...	325	...	389	...	205
May	...	352	...	371	...	205
June	...	359	...	383	...	204
July	...	393	...	373	...	202
Aug.	...	367	...	366	...	201
Sept.	...	350	...	372	...	199
Oct.	...	367	...	380	...	197
Nov.	...	372	...	374	...	195
Dec.	...	386	...	391	...	193
Ave.	...	350	...	377	...	202





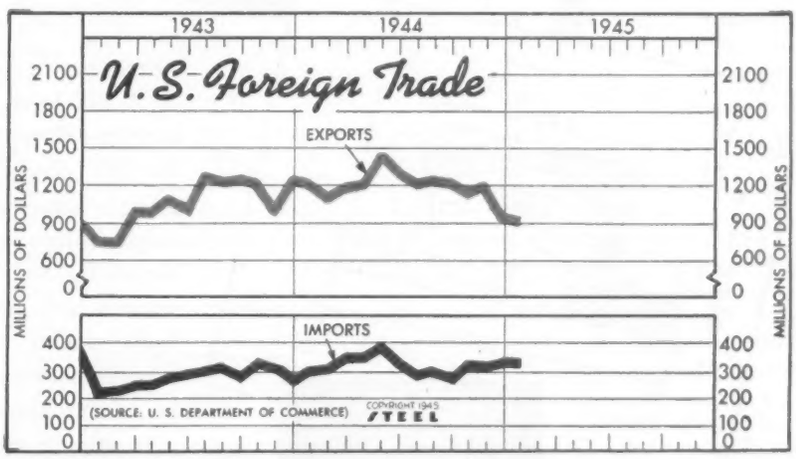
Fabricated Structural Steel (1000 tons)

	—Shipments—			—Backlogs—		
	1945	1944	1943	1945	1944	1943
Jan.	43.5	35.2	91.9	124.4	113.1	339.1
Feb.	36.3	42.9	90.8	151.6	117.6	321.0
Mar.	...	41.4	94.0	....	106.3	299.8
Apr.	...	44.5	86.6	....	111.2	272.5
May	...	50.7	78.9	....	116.3	220.6
June	...	43.0	68.4	....	122.7	207.1
July	...	45.3	56.8	....	125.4	201.8
Aug.	...	55.2	50.2	....	130.4	195.6
Sept.	...	57.5	51.8	....	151.1	208.1
Oct.	...	61.6	80.1	....	174.4	274.0
Nov.	...	59.4	42.7	....	184.2	134.6
Dec.	...	61.3	39.6	....	142.5	113.0

Source: American Institute of Steel Construction. Figures represent members' reports only.

Foreign Trade Bureau of Foreign and Domestic Commerce (Unit Value—$1,000,000)

	—Exports—			—Imports—		
	1945	1944	1943	1945	1944	1943
Jan.	901	1,124	730	333	300	228
Feb.	....	1.086	719	...	313	234
Mar.	....	1,158	988	...	359	249
Apr.	....	1,182	980	...	359	258
May	....	1,419	1,085	...	386	281
June	....	1,271	1,002	...	330	295
July	....	1,198	1,262	...	293	300
Aug.	....	1,207	1,204	...	302	315
Sept.	....	1,199	1,235	...	280	285
Oct.	....	1,140	1,195	...	327	329
Nov.	....	1,184	1,074	...	322	317
Dec.	....	934	1,244	...	336	281
Total	....	14,102	12,716	...	3,907	3,369

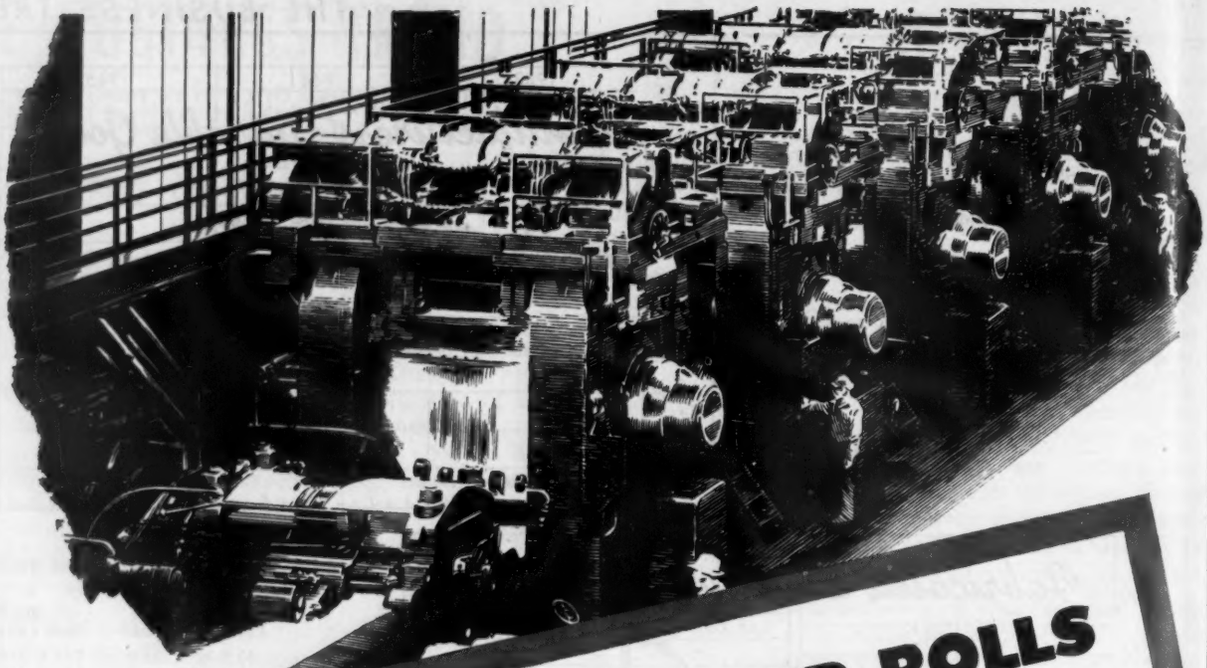


FINANCE	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,228	$10,485	$11,756	$11,268
Federal Gross Debt (billions)	$234.6	$235.3	$234.4	$186.9
Bond Volume, NYSE (millions)	$43.5	$52.5	$48.0	$64.5
Stocks Sales, NYSE (thousands)	5,291	4,503	7,311	6,696
Loans and Investments (millions)†	$58.2	$58.4	$58.9	$52.9
United States Gov't. Obligations Held (millions)†	$43,799	$43,977	$44,061	$38,601

†Member banks, Federal Reserve System.

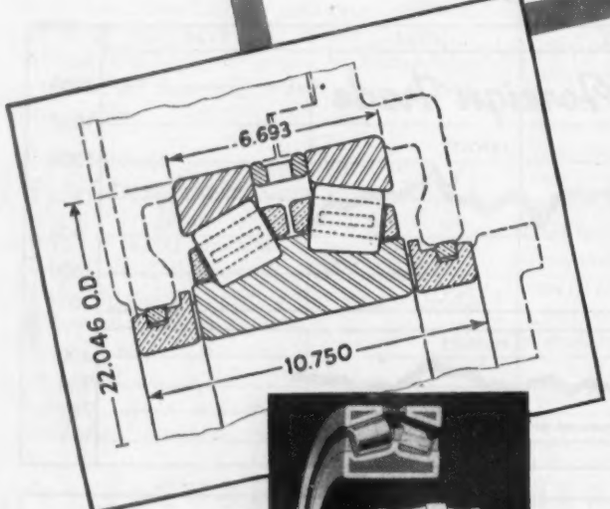
PRICES				
STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.1	105.1	105.0	103.6
Industrial Raw Materials†	116.3	116.2	116.2	113.9
Manufactured Products†	100.3	100.3	100.1	99.2

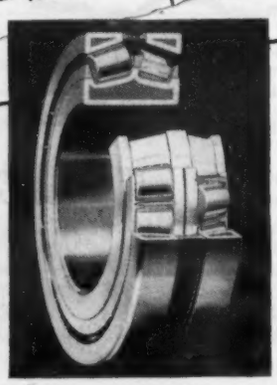
†Bureau of Labor's Index, 1926 = 100.



BEST FOR BACK-UP ROLLS

CHROME NICKEL STEEL ROLL NECK BEARINGS HELP SET PEAK TONNAGE RECORDS





Torrington's two-row tapered roller bearings made of S.A.E.-3310 steel (with higher nickel content), carry the thrust loads imposed on the back-up rolls of this 80" four-high continuous hot strip mill. They provide a much-needed anti-friction application which helps achieve peak wartime tonnages. Features include simplicity of design, controlled lubrication and clearances which permit ready removal from roll necks. Each bearing has a thrust load capacity of 220,900 pounds at 100 r.p.m.—employing 23 rollers, 2¼" long by 2" in diameter, in each of the two rows.

Supplying steel, oil, paper, machine tool and other industries with custom-made bearings for heavy-duty operations is an important function of Torrington's Bantam Bearings Division. Consult Torrington's engineering staff when you have an anti-friction problem, standard or unusual.

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

Navy Cuts Program Sharply To Aid Other War Needs

Tanker program may be reduced also . . . WPB continues to reduce allotments . . . Warehouses given second quarter cut

CUTBACK in the new Navy program from 84 to 12 combat ships caught the steel and shipbuilding industries by surprise and is causing heavy steel order cancellations, some of which will affect rolling schedules as early as April.

With this curtailment also came indications that at the suggestion of the Navy the Maritime Commission may cancel orders for 40 tankers, requiring about 4500 tons of steel each, half of which were to be built by Sun Shipbuilding & Dry Dock Co., Chester, Pa. The twelve ships remaining on the program will be built on the Pacific Coast by Kaiser and Todd yards. Cause of the decision to eliminate so many ships is said to be that naval losses have been much lower than had been expected.

A statement by James Forrestal, Secretary of the Navy, is that the action was taken at the request of James F. Byrnes, Director of Mobilization and Reconversion, and not at the instigation of the Navy. The latter felt that it would not be wise to build the ships in view of the manpower and critical materials required. It is stated that some of the ships may be built at a later date.

Despite removal of this large tonnage the War Production Board has not slackened its pressure for steel, in spite of indications that the European phase of the war may be near its end. Special efforts are being made to screen second quarter requirements closely. Allotments in some cases are being cut further to make room for more important work. The board is following up reductions to assure that affected consumers do not delay in advising mills of withdrawal of their validations.

Hot-rolled pickled sheets and strip are in particularly critical situation, as pickling facilities are inadequate to meet demand for most urgent war requirements, including the Navy bomb program. As a result, warehouse stock orders for these products validated for second quarter have been cut to half, in addition to recent order to jobbers to reduce warehouse load on hot-rolled pickled for third quarter by 50 cent. Second quarter reduction, it appears, will cut orders of all distributors by half but the third quarter cut will apply less evenly, apparently. It is the interpretation of some producers that warehouses which have placed orders for third quarter will receive full requirements until mill load is absorbed, leaving those whose orders were not entered early without any tonnage. Third quarter nail shipments to warehouses are also cut to 50 per cent of former allocation.

Steelmaking is holding at a high rate, recouping much of the loss due to bad weather and transportation tieups early in the year. The estimated national rate for last week was steady at 97 per cent of capacity, the same as the preceding week. Pittsburgh gained ½-point to 92 per cent, Detroit 4 points to 95 per cent from a revised rate of 91 the preceding week, Cincinnati 10 points to 86 per cent, Buffalo 1½ points to 93 per cent and New England 2 points to 90. Wheeling declined 5 points to 93½ per cent and Cleveland 1½ points to 90 per cent. Rates were unchanged as follows: Chicago, 101½ St. Louis, 80; Birmingham, 95; Youngstown, 93; eastern Pennsylvania, 95.

Scrap is in an anomalous position, with supply short of requirements and WPB urging greater effort at collection, on the one hand, and dealers short of labor to process their stocks. Additionally, fear of a sudden end of the war and consequent price break makes dealers and consumers alike wary of accumulating excessive inventory. A few allocations are still used to provide material for melters in need.

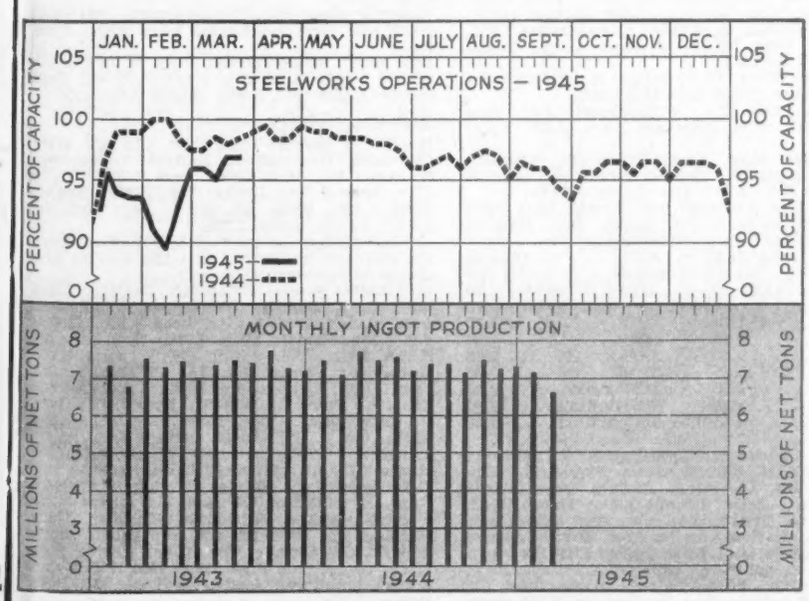
Average price composites are steady at levels of the past few months, governed by Office of Price Administration ceilings. Finsteel $36, steelmaking pig iron $24.05 and ished steel composite is $57.55, semifinished steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Mar. 31	Change	Same Week 1944	Week 1943
Pittsburgh	92	+0.5	93	101
Chicago	101.5	None	100.5	99.5
Eastern Pa.	95	None	95	95
Youngstown	93	None	95	97
Wheeling	93.5	—5	99.5	88.5
Cleveland	90	—1.5	98.5	93
Buffalo	93	+1.5	90.5	90.5
Birmingham	95	None	95	100
New England	90	+2	87	100
Cincinnati	86	+10	86	91
St. Louis	80	None	80	93
Detroit	95	+4	92	94
Estimated National rate	97	None	*99	*99.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Mar. 31	Mar. 24	Mar. 17	One Month Ago Feb., 1945	Three Months Ago Dec., 1944	One Year Ago Mar., 1944	Five Years Ago Mar. 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$56.73	$56.73	$56.73
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	23.55	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.55

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	March 31, 1945	Feb., 1945	Dec., 1944	Mar., 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.20	2.10	2.10
Plates, Philadelphia	2.25	2.25	2.15	2.15
Plates, Chicago	2.20	2.20	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.65	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.65	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts	2.00	2.00	2.00	2.00

Pig Iron	March 31, 1945	Feb., 1945	Dec., 1944	Mar., 1944
Bessemer, del. Pittsburgh	$26.19	$25.69	$25.19	$25.19
Basic, Valley	24.50	24.00	23.50	23.50
Basic, eastern del. Philadelphia	26.34	25.84	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.19	24.69	24.69
No. 2 foundry, Chicago	25.00	24.50	24.00	24.00
Southern No. 2, Birmingham	21.38	20.88	20.38	20.38
Southern No. 2 del. Cincinnati	25.30	24.80	24.30	24.30
No. 2 fdry., del. Phila.	26.34	26.34	25.84	25.84
Malleable, Valley	25.00	24.50	24.00	24.00
Malleable, Chicago	25.00	24.50	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	24.69	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33
Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$19.75	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2. Do., over ⅜—⅝-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.65	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6 40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

•Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

•Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	.....
•316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
••410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

•With 2-3% moly. †With titanium. ‡With columbium. ••Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅝ and ⅝ x 6-in. and shorter ... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	56
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	•7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75

By-Product Foundry

Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.88

•Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[11]	4.715	6.012[22]	6.012[22]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[13]	4.872[13]	4.072[21]	4.772	5.816[22]	5.860[22]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[20]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.896[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[15]	4.40[10]	3.75[21]	4.669	5.60[22]	5.75[22]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[10]	3.65[21]	4.35	5.60[22]	5.75[22]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[15]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[15]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[1]	5.027[13]	4.40[24]	3.75[21]	4.45[21]	5.60[22]	5.65[22]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[13]	4.500[24]	3.800[21]	4.659	5.93[22]	5.93[22]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[19]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[13]	4.20[24]	3.75[21]	4.65	5.75[22]	5.85[22]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[13]	4.337[24]	3.887[21]	4.787	5.987[22]	6.087[22]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[13]	4.568[24]	3.98[21]	4.78	6.08[22]	6.18[22]
St. Paul	3.76[3]	3.81[3]	3.91[3]	5.41[3]	3.61[3]	3.86[3]	3.86[3]	5.407[15]	4.46[24]	4.361[21]	5.102	6.09[22]	6.19[22]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[22]	6.231[22]
Memphis, Tenn.	4.015[3]	4.065[3]	4.165[3]	5.78[3]	4.065[3]	4.215[3]	4.215[3]	5.415[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[20]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.35[3]	5.50[3]	3.863[3]	4.313[3]	4.313[3]	5.463[15]	4.10[10]	3.65[23]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[13]	7.20[6]	5.583[20]	5.613	5.85[22]	5.95[22]
San Francisco	4.15[7]	4.35[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[15]	5.333[21]	7.333	8.304[22]	8.404[22]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[5]	4.45[5]	4.85[5]	6.50[5]	4.75[5]	4.25[5]	5.45[5]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[22]
Seattle	4.35[5]	4.45[5]	4.85[5]	6.50[5]	4.75[5]	4.25[5]	5.45[5]	6.10[15]	7.60[15]	5.783[21]	.....	.....	8.00[22]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles. [19]—100 to 749 pounds; [20]300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural)
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — C	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnaces Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10 .15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del	2715	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base) $30.50

6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c. 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c. 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max, sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight alloyed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for silicon, bulk, c.l., 5.80c, 2000 lbs. to 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N.Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	14.00
Short Shovel, Turnings	16.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	9.00- 9.50
Mix. Borings, Sht. Turn	9.00- 9.50
Short Shovel Turnings	10.00-10.50
Cast Iron Borings	9.00- 9.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00
(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)	

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	13.00
Short Shovel. Turnings	15.00
Mixed Borings, Turn.	13.00
Cast Iron Borings	14.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	9.00- 9.50
Cast Iron Borings	10.00-10.50
Short Turnings	11.00-11.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	7.00- 7.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum; 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $161 to $165 in smaller quantities

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Hereuloy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 182

Sheet deliveries are pressed further into the future as orders continue to exceed production, in some cases well into next year. War Production Board is sifting second quarter orders to gain space for most pressing war needs.

New York — Sheet backlogs continue to expand and further efforts are being made by the War Production Board to screen second quarter tonnage so that capacity can be made available for more pressing munition programs. Jobber allotments of hot-rolled pickled sheets will be subject to a further cut, according to trade reports, so that more steel can be devoted, for one thing, to the Navy's bomb program.

Meanwhile, most producers are now quoting hot-rolled pickled sheets for delivery in November and December and cold-rolled sheets for shipment from October into next year. Some producers now have little or nothing left in cold-rolled sheets before January.

Galvanized sheet deliveries still cover a fairly wide range. Some mills have little tonnage available in October and others none before February. High-silicon sheets, in heavy demand for radar and aircraft work, are available for September shipment, but deliveries are not as extended as in low-silicon sheets, as more capacity is being devoted to the higher grades and that there are substantial requirements for fractional horsepower motors and similar types of equipment, requiring the lower silicons. Some producers are now booked well into next year on low silicon.

Stainless steel deliveries fall in July and August. Due to greater efforts to conserve this material through restriction of its various uses, deliveries at present are not being extended as rapidly as earlier in the year. However, heavy requirements are in sight, especially for the jet propulsion program.

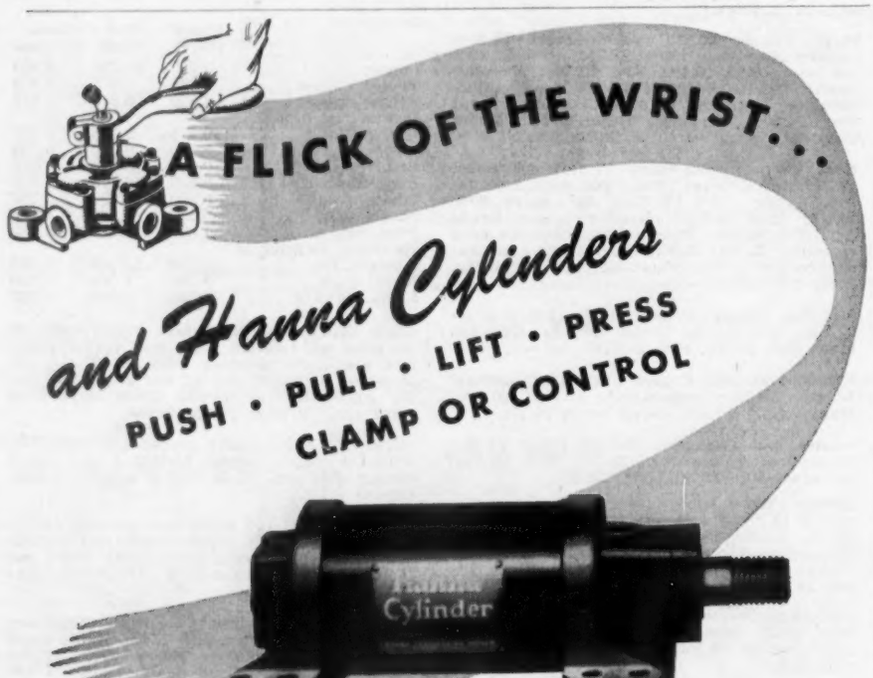
Cincinnati — Sheet rolling has been resumed by Andrews Steel Co., Newport, Ky., after loss of production for about a month, due to Ohio river flood. Resumption of steelmaking lagged only a few days. Books of district sheet mills are practicaliy filled for the remainder of the year and the overload makes the situation even tighter. Shipping facilities are improved and there is less lag in deliveries. The carryover into April is heavy as the result of directives in recent months.

St. Louis — Sheet production has improved slightly as more labor is available and is the best since November. Cold-rolled deliveries are extended to January with orders still exceeding production. Hot-rolled sheets are available for October. Pressure is still great and producers complain of an excess of directives.

Boston — Slackening mill orders for sheets and narrow cold-rolled strip, with scattered impressive volume, are accompanied by moderate reductions in outstanding commitments, in line with pressure directed toward elimination of all tonnage possible in backlogs. While the total is not heavy, affecting April schedules to a mild degree, the trend is gaining momentum and May lists may reflect winnowing of tonnages. More gaps are reported to WPB and filled by that agency. Other products are involved more than flat-rolled. Steel for fabricated products outside immediate war urgency programs is for the most part lopped off, ranging to 20 per cent in some instances, although some minor war tonnage is noted. Immediate influence of this is retarded by the fact that the cycle of production has started for this month. Contributing to slower buying are extended mill deliveries, tightening warehouse supplies and declining new fabricating shop orders. While scattered openings permit September scheduling on hot-rolled carbon sheets, deliveries cover a wide range through the remainder of the year and into next. With some producers there is growing opinion that tonnage at the end of backlogs is becoming uncertain as to ultimate disposition, reflecting possible cutbacks and revisions at war's end. This is also having some influence on new buying, especially in the longer delivery range.

Pittsburgh — Despite efforts to eliminate some excess sheet tonnage, the situation is still extremely confused, with virtual capacity operations making little headway against increasing backlog. This is true of both hot and cold sheet mills and about the only answer is a better manpower situation which would enable mills to boost output or complete revision of order books and elimination of substantial tonnage from present commitments. As things now stand no mill is running on current promises and carry-overs from March into April will run from 30 to 60 days in most cases.

Cleveland — Sheet demand continues



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to pyramid with no important increase in output. There are practically no openings on rolling schedules until fourth quarter, with deliveries on galvanized sheets extended well into next year.

To relieve sheet producers of special processing operations on steel distributors' orders, which can be performed by other than steel producers, mill shipments of hot-rolled pickled sheets and strip to warehouse interests during second quarter will be only 50 per cent of tonnage accepted for delivery in that period.

Philadelphia — Shortage of sheets is reflected in further delivery extension. Apart from gaps due to curtailment in allocations, which are promptly filled by WPB, most mills are unable to handle new hot-rolled pickled tonnage before November or December, with some tonnage available on plain hot-rolled in October. Cold-rolled sheet deliveries range from November into next year, with one unit quoting March. In galvanized, deliveries to consumers range from October into next year, although jobbers are scheduled to get larger tonnage in third quarter as allotments have been increased 50 per cent of base quota against 40 per cent at present. Deliveries on hot narrow strip have tightened further, with one large producer quoting April on four to nine-inch and January on nine to 12-inch. Only on narrow widths can this seller do anything during the next few months, quoting August, and then only on light gages. One producer is sold solidly into January on all grades of electrical sheets.

Steel Bars . . .

Bar Prices, Page 182

Pressure for steel bars shows no diminution and mills are booked far ahead, most current demand being for shells and rockets. Except in small sizes of hot-rolled carbon and in electric furnace alloy bars few producers have any capacity open before the end of the year. Cold-drawn bars can be booked for fourth quarter with some mills. In some cases users have accepted altered specifications to obtain earlier shipment.

Pittsburgh — Although billet supply is tight and transportation difficulties complicate an even flow of semifinished steel to bar mills, there is some hope that the output in April will be larger. Current operating rates on bar mills as a whole probably top 60 per cent of capacity. Cold-finished operations now are close to 80 per cent of capacity, but little headway is reported against an increasing backlog of cold-drawn business.

New York — Except in certain small sizes of ordinary bars and in electric furnace alloy bars, producers have nothing to offer before fourth quarter and in some larger sizes nothing before next year. In the case of hot-top quality bars, certain sellers are booked up solidly on all specifications until next year, quoting March in larger diameters. This latter situation reflects principally demands of the shell program.

Cold-drawn bars, for the most part, cannot be had before fourth quarter, especially 1½ inches and larger. Shell fuse and rocket requirements contribute principally to this situation, to say nothing of gun components and bearings.

St. Louis — Bar demand increased considerably last week, attributed to shell and rocket programs and replacement parts. Makers are sold for several months and civilian needs are further delayed. Greater pressure is foreseen, even after V-E day.

Boston — Bar consumers have ordered as far ahead as allotments permit in most cases, some into next year, and relatively slight tonnage has been affected by cutback revisions thus far. Buying is slower and closely geared to deliveries. One inquiry for just under 1000 tons for May delivery is seeking a supplier. In carbon stock sizes in the middle range deliveries have lengthened sharply. When opportunity offers, some changes in specifications are accepted when delivery is possible, although the accepted grade is sometimes $10 per ton higher. Mill orders are also going to warehouses on delivery factor, as in case of a substantial inquiry for August. A chain fabricating shop out of the market for some months and operating mainly on inventory has placed orders for carbon bars. Open-hearth alloy schedules are in October and electric-furnace alloys about a month better, although the spread is narrowing, due to some switch of orders to the latter, due to slightly better chance of getting steel earlier. There is slackening of consumption among leading fabricators. Both cold finishers and warehouses are pressing for tonnage.

Cleveland — Sellers note continuation of downward trend in directive tonnage, which approximated about 5 to 10 per cent of the total early last month, reflecting rigid screening of requirements instituted by WPB Steel Division in re-

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cent weeks. Heavy ammunition production schedules may not be met over the coming months because of failure to obtain sufficient tonnages of quality hot-topped steels for shell forgings. Further increases in hot topping facilities are said to be absolutely necessary. Carbon bar delivery schedules are still expanding with practically all sellers booked solidly into fourth quarter, except on smaller sizes in a few instances. Electric furnace alloys are in somewhat better delivery position.

Philadelphia — While carbon bar flats are fairly easy, with offerings as early as August, rounds are being quoted generally for fourth quarter. On quality steel some producers are booked for the year. One seller is sold into March on 2⅜-inch and larger. Alloy steel bar deliveries, even including electric furnace steel, fall mainly in fourth quarter.

Steel Plates . . .

Plate Prices, Page 183

Demand for steel plates continues to taper, though mills still have heavy backlogs. Much tonnage is required by shipbuilding and repair. Negotiations for large diameter pipe for Holland are understood to be under way, for the drainage program.

Philadelphia — Reduction in the Navy program, officially ascribed to losses being less than expected, leaves only 12 escort aircraft carriers, all to be built on the Pacific Coast, eight at the Kaiser yard at Vancouver, Wash., and four at the Todd yard at Tacoma, Wash. While this program was scheduled to extend until the end of 1947, cancellations will open gaps in second quarter schedules, particularly in plates, large forgings and various special steels. While until recently most plate mills were booked solidly until June, with at least one large producer out of the market for first half, there now should be substantial capacity in May with carryovers in general well worked off by the end of April. First on the shipbuilding program as it now stands are large assault transports, with mounting volume of repairs, now restricted by labor shortage at various yards.

Yards affected by the naval curtailment are as follows: Newport News Shipbuilding Co., two battle carriers; Brooklyn Navy yard, two carriers; Philadelphia Navy yard, one carrier; Norfolk Navy yard, two carriers; Bethlehem-Fore river, one carrier; New York Shipbuilding Co., Camden, N. J., four heavy cruisers; Bath Iron Works, 11 destroyers; Boston Navy yard, four destroyers; Bethlehem-Staten Island, eight destroyers; Consolidated Shipbuilding Co., Owings, Tex., ten destroyers; Charleston Navy Yard, three destroyers; Portsmouth Navy Yard, three submarines; Electric Boat Co., Groton, Conn., three submarines.

New York — Plate buying is tapering, although substantial tonnage is going to shipowners and ship repair yards. Tank fabricators have less work on hand, and in view of restrictions on domestic freight car construction there has been not only a falling off in new requirements, but a cutback in tonnage already on order. Some large diameter fabricated pipe for Holland was reported under negotiation, with a commission due from that country within the next three or four weeks. The pipe, it is said, is to help drain the flooded areas of Holland, but little in the way of detail is available.

Boston—Spread in unit bids for 12 single screw diesel tankers, T-1 type, by two New England yards is noteworthy. Walsh-Kaiser Co., Providence, asks $1,100,000 each and New England Shipbuilding Co., South Portland, Me., $595,168, lowest of all tenders. Both are considered high-cost yards and need work beyond completion of current contracts by mid-year. Lawley yard, Neponset, bid $776,006 on four boats. The latter has six small tankers to build, start being delayed by a substantial landing craft repair contract to be completed this month.

St. Louis — Plates continue under heaviest pressure and better labor situation has aided production. One producer reports manpower supply nearly 20 per cent better, due in part to steel wage negotiations and to better weather. Plate output is sold to the end of the year and beyond. Considerable sheet-making capacity is still on plates. Superseding directives continue to upset schedules.

Chicago — One important plate producer estimates its Maritime Commission plate load directive for July will represent only 54 per cent of March, and less than 38 per cent of July, last year. With little additional Maritime business seen for last half, this mill is soliciting third quarter plate business. Production of plates has ceased to press producers and shipments are well abreast of output directives. It is understood the Maritime Commission is in process of can-

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celling a part of its tanker program. On the other hand, some western yards have received additional contracts for landing craft.

Tubular Goods . . .

Tubular Goods Prices, Page 183

New York — Although buying by local plumbing and heating contractors is light, pipe distributors here are able to move all the pipe they can get. Ship repair yards, utility companies and others are pressing for pipe and considerable tonnage is being purchased out of storage for shipment abroad.

Considerable pipe is still moving to the armed forces after being cut into short lengths for use as barbed wire entanglement supports. Further, plumbing and heating pipe is being purchased at present for prefabricating housing units for England and France. Orders have been placed recently by the Federal Housing Authority for more than 42,000 of these units for England alone. Each 3000 units, it is said, requires 1200 bundles of ¾-inch galvanized pipe, 200 bundles of ½-inch galvanized and a small amount of 1-inch galvanized pipe.

In addition, 5000 prefabricated units are required for France. These are barracks-type units installed primarily to house dock workers. However, pipe requirements per unit will not run much heavier than those for the English, which are of a more permanent character and are family dwelling units to house persons who have been bombed out of their homes. The English units are one-story panel structures with flat roofs of corrugated metal, it is said.

Deliveries of seamless pipe are extended several months, with the situation so tight that consumers of 50 tons or more of seamless line pipe, which ranges from 2 to 12 inches in diameter, must first secure special approval of the War Production Board. Stringency is ascribed principally to shell and bomb work.

Butt-weld pipe is generally available in July and while some producers are as far extended on lap-weld, the latter type of pipe can be had with little difficulty for delivery in May; also electric welded pipe.

Hot seamless tubing in the carbon grades is being quoted for shipment from July to November, depending much on size. Smaller sizes, ranging from 1-5/16 to 2¾ inches in diameter with lighter walls, can be had in July. Other sizes fall in fourth quarter in most instances. Thus locomotive boiler tubing can be had in July, while marine boiler requirements cannot be had much before October. Superheater tubing is quoted by some leading sellers for November shipment.

Cold-drawn tubing is being offered for Septetmber shipment on sizes up to 2 inches in outside diameter. The aircraft industry is buying actively in these sizes and increasing tonnage is going into the bazooka program. The Navy and Maritime Commission requirements of cold-drawn tubing over 1½ inches, heavier than 10 bwg, and up to 6½ inches, have pushed schedules on this type of tubing into next year in some cases. Users of mechanical tubing are also contributing heavily to expansion in cold-drawn schedules.

Locomotive building and repair schedules are well filled for the remainder of the year, all of which assures a substantial movement of boiler tubing. While there will be certain cutbacks in ship construction, the general prospect in this field is also encouraging for the remainder of the year as far as actual consumption of pipe is concerned. However, new orders taper sharply, being supported principally by ship repair requirements.

Boston — With seamless tubing among the tightest steel products, notably over four-inch, not all tonnage required for mortar shells and bombs to be fabricated in this area is firmly fixed in mill schedules. Some producers are filled through the remainder of the year above four-inch sizes and any new tonnage placed for wanted deliveries will be at the expense of volume already booked. Welded tubing is not as critical, with some space open for third quarter. Butt and lap-weld pipe are available for July. Demand for merchant pipe with industrial distributors is fairly brisk, but those supplying plumbing and heating consumers are doing little, while shipyard requirements tend downward. A mild flurry in cast pipe buying and inquiry is only a fraction of the seasonal activity at this period. Consideration is given to revision of some shell programs to billets and bars from seamless tubing in view of tightness in the latter.

Seattle — Cast iron pipe demand is limited by priorities and delivery, which is slow, at 60 to 75 days. H. G. Purcell, Seattle, is low to Portland for 15,000 feet of 8-inch pipe, 290 tons, for several improvements. Portland will

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open bids April 6 on 800 tons of 5 to 14-inch, with alternates on smaller sizes. Seattle district 49 has plans out for about 100 tons and Seattle will take bids soon for three improvement projects.

Wire . . .

Wire Prices, Page 183

Chicago—Jobbers' and dealers' stocks of small nails have been virtually wiped out for boxing of cartridges and small munitions parts. Cement coated nails, used in packing and crating heavy war goods, also are in short supply. Requirements for steel fence posts is far in excess of production.

Pittsburgh — Although operations continue high, particularly in fine wire for manufactured items, there is some doubt as to future possibilities in the merchant market, particularly in view of expected stricter control of warehouse ordering of such items as nails and fence. Some mills report available capacity which might be used in producing civilian wire items if such orders could be authorized. However, current tonnage on civilian programs is extremely low. If steel becomes available, both merchant and manufacturers' wire items could be ordered for June or later. Under existing circumstances, however, second quarter is completely filled and substantial tonnage is already on books for third and fourth quarters.

Cleveland — Mill warehouse load directives on wire nails, beginning in the third quarter, are to be cut to 50 per cent of former base quotas. This new warehouse load basis is expected to better enable mills to schedule mixed carload orders of merchant trade products received by distributors.

Tin Plate . . .

Tin Plate Prices, Page 183

Chicago — An important tin plate maker in this district reports October as the first month with openings and the delivery situation growing worse. Contributing factors to the latter are insufficient transportation and lack of manpower. Another producer is experiencing better receipts of cars in the last few days and has been able to move some previously piled plate out of storage. Number of cars practically doubled in a week's time.

Pittsburgh — Mills continue to book new business on the basis of existing operations, which are at the rate of 825,000 tons per quarter. Most sellers have filled up second quarter books and are well through third quarter on much tonnage. Operations are unchanged despite the fact that backlogs of steel are somewhat lower, with cold mills operating at about 80 per cent of capacity. This rate of production on cold strip mills is sufficient to maintain hot-dip operations at about 60 per cent of capacity and electrolytic at about 40 per cent. Mills are looking forward to heavier volume of orders on light weight plate during last half. Some canmakers have indicated that if there is a shift in the steel situation they will be in a position to produce more general line cans later this year, particularly if the end of the European war eases overall pressure somewhat.

Structural Shapes . . .

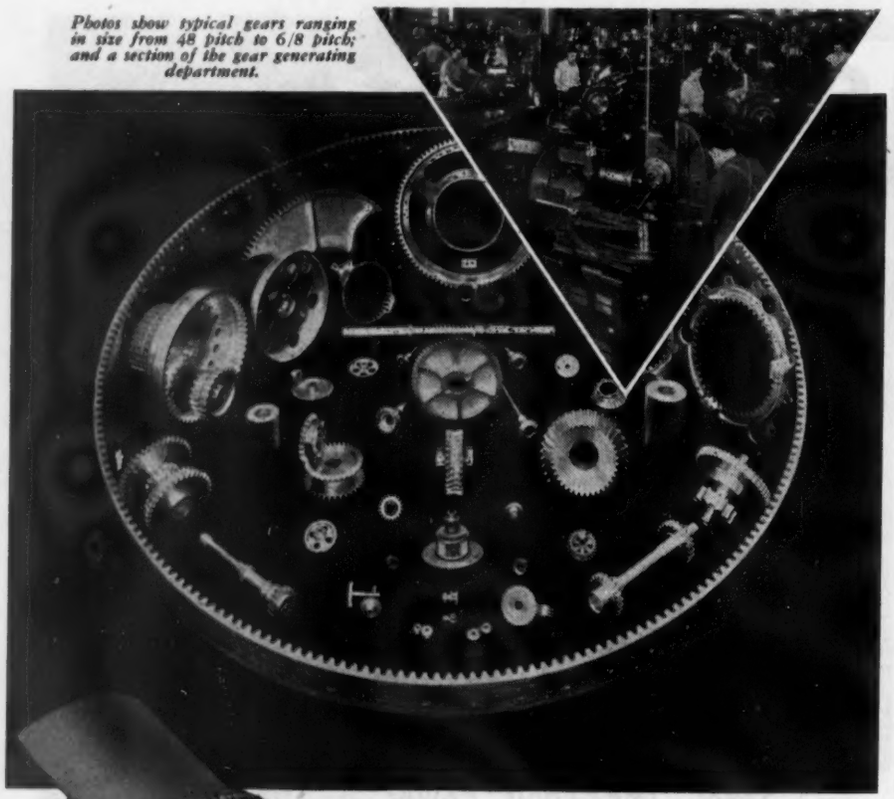
Structural Shape Prices, Page 183

Philadelphia — Most shape producers have little to offer before July, with mills booked solidly into August. However, reduction in shipbuilding may alter this situation soon, if further pressure for shell work does not offset it. At one shape mill shell work is absorbing more than 75 per cent of capacity.

Boston — While structural inquiry and fabricating contracts in the northeastern area are light shape deliveries have lengthened to August with some producers. Demand on equipment and available semifinished steel, with substantial urgent army engineer needs for hangars, bridges and warehouses contributes to tightness in shapes rather than overall pressure. With shipyard orders slackening, notwithstanding several thousand tons just placed for small tankers and naval vessels, district fabricators most in need of tonnage have bid on 6000 tons of Treadway bridge sections, high tensile material. Heavier demand for bearing and sheet piling has also taken space on shape mills, in addition to fabricating contracts being awarded against about 65,000 tons for miscellaneous army engineer work in the Midwest, mainly light shapes. For a second extension to a brass fabricating plant at Euclid, O., a Boston contractor has placed 1000 tons.

New York — American Institute of Steel Construction reports contracts closed in February for fabricated structural steel for bridge and building construction totaled 57,333 net tons, compared with 39,953 tons in January and

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



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37,477 tons in February, 1944. Shipments in February were 36,283 tons, compared with 43,484 tons in January and 42,938 tons in February, last year. For two months this year bookings were 97,286 tons, compared with 82,586 tons in the comparable period last year, with shipments 79,767 tons, against 78,101 tons.

Seattle — Major structural projects are being held back and potential backlog is assuming large proportions in this area. A second bridge across an arm of Puget Sound at Bremerton, Wash., is planned, state and city appropriating $850,000. No date has been set for bids. Structural plants are busy on government work and many have backlogs of subcontracts from shipyards, airplane factories and other jobs.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 183

Pittsburgh — Most producers are booked into third quarter, with a substantial tonnage of jobs awaiting placement. The overall volume of business is not high but available quantities of steel are considerably reduced, due to shortage of rerolling rails and tighter restrictions on use of billets. The heavier tonnages of new products are government jobs, largely Army and Navy installations. Despite current tightness there are continual reports of prices below ceiling quoted on some recently closed tonnages.

Rails, Cars . . .

Track Material Prices, Page 183

New York — Domestic car buying is featureless at the moment, although announcement has been made of the award of 500 fifty-ton box cars by the Canadian National Railways to the Eastern Car Co. Ltd., Trenton, Nova Scotia.

Pere Marquette, recently noted as having awarded two 1000-horsepower diesel-electric switch engines to the Electro Motive Division, General Motors Corp., La Grange, Ill., has now raised the total to 10. Mexico is reported interested in a large number of locomotives, but only a few of the 4-8-4 type are active at the moment.

Belgium is reported to have placed 100 locomotives in Canada. That country originally inquired for 300 but award of the remainder has not been announced. Negotiations are under way for a substantial number of locomotives and about 30,000 miscellaneous freight cars for rehabilitation in Europe. Delivery is desired for completion by second quarter, 1946.

Cleveland — Chesapeake & Ohio railway has requested WPB permission to build three revolutionary coal-burning locomotives combining use of steam turbines and electric drive. Baldwin Locomotive Works has completed basic designs and will build the new units. Westinghouse Electric & Mfg. Co. designed the steam turbine and electrical equipment.

Pig Iron . . .

Pig Iron Prices, Page 185

Pig iron conditions are easy, supply being sufficient for needs and consumption running fairly evenly. Transportation improvement has overcome shortages resulting from snow conditions. More iron is being consumed than usual in some foundries, to make up for shortage of cast scrap. Second quarter coverage is about the same as for first.

New York — While pig iron continues to move a little more freely, district foundries are unable to build backlogs, due to excessive drain on iron to make up for shortage in scrap. Little cast scrap is available and there is small possibility of improvement in supply soon.

Another factor in the restricted melt is shortage of manpower, which shows up in some cases where operators appear able to get adequate supply of iron.

Sellers of Buffalo iron see little possibility of getting tonnage moving by the New York state barge canal before the middle of April, especially because most barges put in at the lower end for the winter and consequently have to be moved to Buffalo before extensive loading of iron can be started. In view of the existing shortage, some trade leaders believe that little iron will be moved into this district by barge for some time, in any case, because of speedier transportation by rail.

Boston — Pig iron melt has increased about 7 per cent, mainly in foundry grades, due partially to tight supply of cast scrap and in individual cases as much as 10 per cent, as with one large consumer in the textile equipment field, but a slight increase in labor supply is a minor factor. The latter group is taking some iron for April delivery, covering the current melt, but the total probably is geared to 30-day inventory limitations. Second quarter covering is

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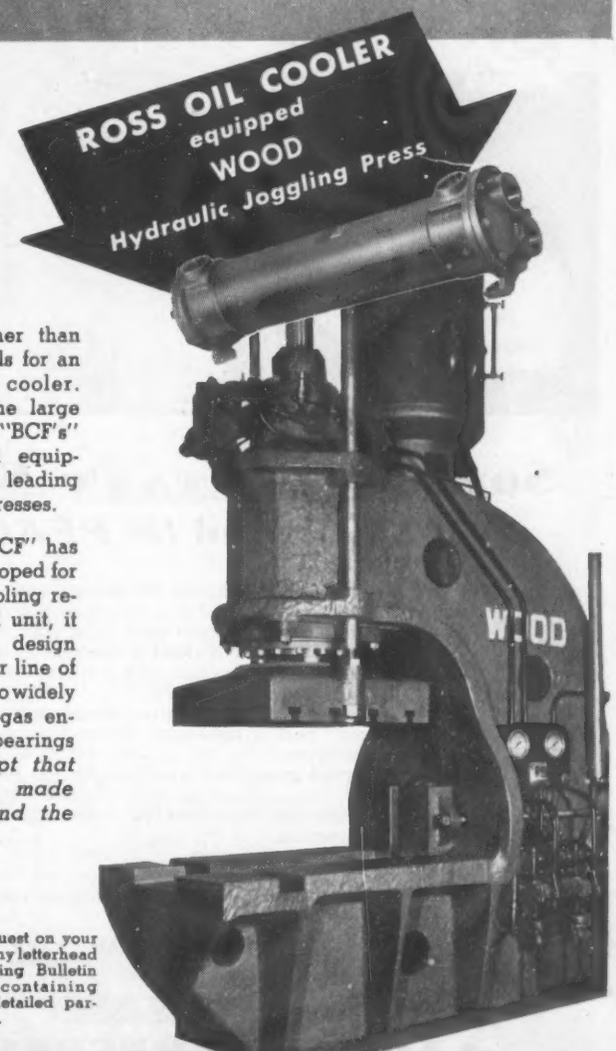

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well advanced and releases this month are up to capacity of furnaces to meet schedules. Furnaces in the Buffalo district have no tonnage piled but are depending on current production to meet demand. The district cast pipe foundry, normally taking about 1000 tons per month, has been down for months, a situation contributing to spreading of supply by the district furnace. Resumption of operations at Everett, Mass., is uncertain. Even if barges are available little iron from Buffalo by canal is likely before May.

Buffalo—Merchant pig iron producers report wide diversification in orders, with little civilian tonnage. One important seller expects foundry demand to be sustained during the quarter, even in the event of peace as foundry reconversion will be less difficult than for other industries. Railroad car supply is much better, aiding shipments.

St. Louis — Pig iron supply has not improved, though consumers are able to obtain requirements on a day-to-day basis. Stockpiles are virtually absent. Smaller foundries are more affected. No improvement is seen before the October quarter.

Philadelphia — Blowing out of the No. 2 furnace at Swedeland, Pa., for repairs after a continuous run of several years, is being seriously felt. The stack, which has been producing about 175,000 tons annually, was scheduled to be blown out about Feb. 15 but was kept going until trouble forced suspension March 26. If complete relining is required it probably will be out of blast six to eight weeks. The larger No. 1 furnace continues in operation, supplying hot metal for Alan Wood Steel Co. primarily. Other producers are being called on to meet emergency requirements of consumers who have depended on Swedeland, particularly basic consumers. End of the European war is not expected to cause a drop in pig iron prices. Last fall when scrap prices broke in the optimistic period pig iron prices resisted. Balance between demand and production of iron during reconversion is considered promising, with consumers of foundry iron, particularly, expecting as much business as manpower will permit them to handle for some time.

Cleveland — Freer movement of cast scrap and pig iron has aided foundry operations somewhat. Pig iron sellers report second quarter contracting indicates moderate improvement in iron consumption. Blast furnace activity here remains at near capacity with 13 out of 14 units in blast. Increase in second quarter pig iron requirements is reported from foundries serving the machine tool, farm and railroad equipment industries.

Chicago—Pig iron demand for second quarter appears unchanged from first quarter level. However, the rapid moving events in Europe could change this picture and reduce demand. But in this connection, it is pointed out that shortage in castings is sufficiently critical that easing here would not occur in an important way until later. Shortage of foundry scrap aggravates the pig iron situation. Few melters have the maximum of 30 days inventory. Rail transportation is now adequate for iron movement, but coke deliveries are delayed because proper types of cars are not to be had freely.

Cincinnati — Most melters have covered for second quarter pig iron needs. Requirements appear heavier, partly in attempts to build up inventories, partly to offset shortage of cast scrap. Should there be an easing in labor, district foundries would aim for expansion. Shipping problems are not as serious as recently, although most interests hope for heavier reserves against a lag in receipts.

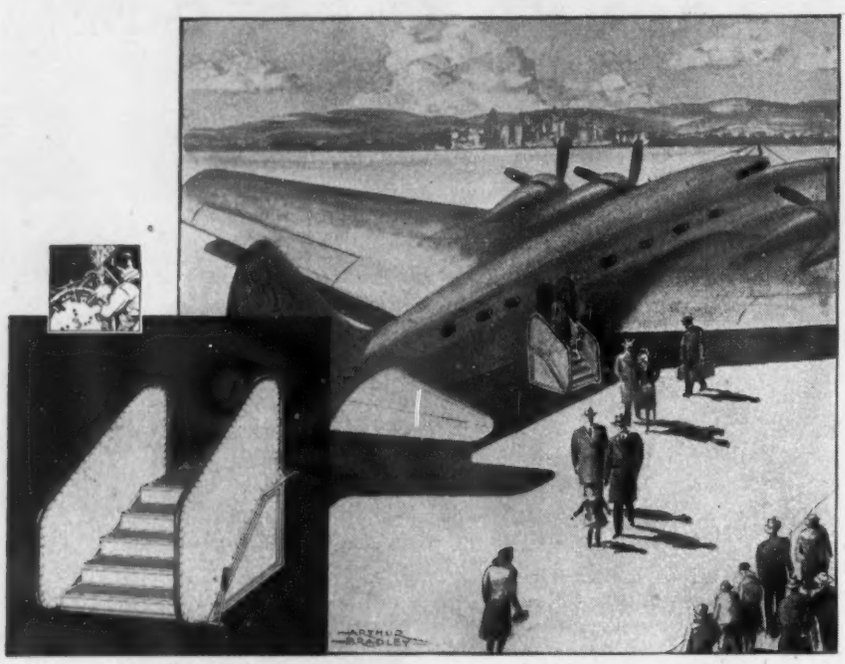
Scrap . . .

Scrap Prices, Page 186

Scrap movement is somewhat better as weather and transportation conditions improve, but lack of sufficient workers handicaps preparation. No improvement in supply of cast grades has taken place. Steelmaking grades are in better volume and melters are accepting freely. Except for borings and turnings prices continue at ceilings.

New York — While melting steel scrap is moving a little more freely as a result of continued improved weather conditions, shipments are greatly restricted because of shortage of manpower. Freer use of high labor ratings may help some, but dealers do not count too greatly on it. The point that many make is that there are too many higher priced jobs in other branches of war work. Leading dealers here declare that less than one-third of their equipment is in operation because of inability to get labor. Cast scrap movement is fairly negligible because of lack of material. There are accumulations in melting steel, but not in cast scrap, it is emphasized.

Chicago — Disagreement still exists



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on whether No. 2 dealer bundles are at ceiling or remain $2 below, the same as machine shop turning bundles. Over two weeks ago, No. 2 solid bundles appeared to have returned to ceiling and turning bundles to near ceiling when an important steelmaker purchased the former at $18.75 and the latter at $18.50. Almost immediately, however, both items were canceled. No. 2 bundles were not re-ordered, but turning bundles were at $16.75. In the meantime, another mill has paid ceiling for No. 2 dealer bundles, but quantity is believed small and it is not known that they are for consumption in this district. As compared with bundled turnings, production of No. 2 solid bundles is small and trading is light. In ordering, some consumers do not differentiate between solid bundles and baled turnings in purchasing No. 2 bundles, but admittedly receipts contain little solid grade. Although some interests regard $16.75 as the top quotation, others are frank to say that in view of the overall scrap situation they would command ceiling if available in worthwhile tonnage, and this seems to be the reliable gage. Backing this up, a few contend solid bundles have held ceiling all the while. Buying of open-hearth scrap is regular but only comparable to current requirements, and, except for turnings, prices are at full ceiling. Foundry grades are scarce.

Boston — Some shading of the $11.06 price for short shoveling turnings is being done in addition to refusal to pay port differentials, but except for turnings all grades are at ceilings, including unprepared heavy melting steel at $11.55 quoted by Harcon Corp. for 500 tons sold by the Boston Navy Yard. Heavy melting for steelmaking remains tight and mills progress slowly in building inventories. With some allocations current steel mill melt is about met. Supply of light industrial scrap is ample but melters are about at the limit in employment of these grades, with alloys frequently found in bundles. Alloy turnings are weak at $5. Foundry scrap is still scarce, with little in sight. One textile mill equipment shop has supplied some tonnage to gray iron melters in the nearby area, from inventory, although textile shops are getting less scrap than normal from usual sources. Several have relatively large reserves, compared with overall foundry supply, which is well under 60 days.

Pittsburgh — There are few new developments in scrap; buying is active and supply relatively light but increasing. Cast scrap continues tightest, with some foundries now operating below their usual scrap-pig-iron ratio. Volume of turnings from shell plants continues to increase and local crushing plants are processing considerable volume.

Detroit — On the basis of prices paid for Fisher Body and AC Spark Plug scrap lists which closed early last week, a stronger tone is indicated in borings and turnings, but not of sufficient emphasis to justify a change in published prices. Chrysler, Buick and Chevrolet Gear & Axle lists, including practically all items, were due to close late last week and will provide clearer indication of immediate price trends in items still below ceiling level.

Philadelphia — Heavy melting steel consumers report some betterment in shipments but assert they are unable to build stocks. To get reserves up to 45 days, as suggested by WPB will require time. In view of developments in Europe there is not much incentive to build inventories. Consumers are pushing hard for tonnage against existing contracts but are moving cautiously in entering new contracts. While it is unlikely there will be as sharp a drop in scrap prices at the end of the European war as was the case last fall, there is likelihood of a drop.

Cleveland — Mills report substantially better stock position compared with a few weeks ago. Heavy melting steel grades and some cast items are scarce. However, considerable tonnage of heavy melting scrap is expected to arrive by lake this month, with additional tonnage scheduled through the balance of the navigation season. Production scrap, mainly turnings, continues to flood the market. Railroads have recently been able to process more scrap and more good quality railroad scrap is now available.

Cincinnati — Active demand for cast grades and rails is the feature of the scrap market. Otherwise supply seems fairly even, with mill stocks adequate. Transportation has improved, though car supply is short. Considerable tonnage is released by subsidence of flood waters and better weather but labor scarcity limits preparation.

St. Louis — Better weather has improved scrap movement somewhat and many back orders are being filled. Mills, however, have been unable to stockpile

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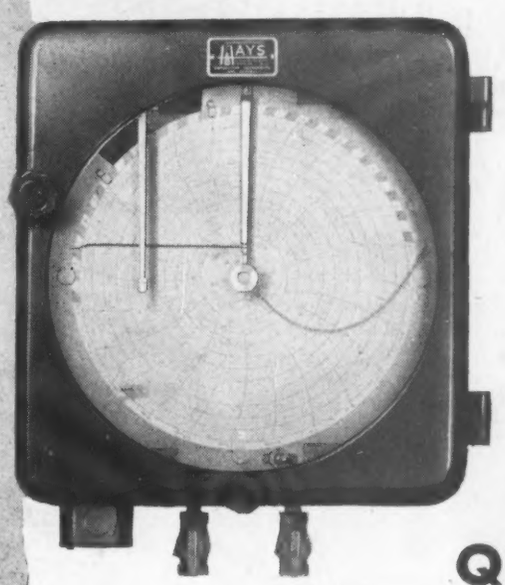

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more than three to four weeks supply, compared to the desired 45 days. New offerings are not increasing and manpower shortage continues.

Buffalo — With an estimated 100,000 tons already under contract with upper lakes sellers, leading scrap consumers await opening of navigation to replenish shrinking reserves. In absence of contract price protection dealers avoid accumulating material and yard stocks are kept low. A leading steelmaker is reported using 1000 to 3000 tons per day from reserves. Turnings constitute a large portion of current shipments. Railroad scrap allocations are reported from another district.

Los Angeles — Prices of scrap are unchanged with current sales at $3 below ceilings on heavy melting steel, up to $7.50 below on borings and turnings. Geneva and Bethlehem are reported taking scrap while the Kaiser plant at Fontana is out of the market temporarily, except for some shipyard tonnage. Columbia Steel Co. is buying little currently as two furnaces are down for repair. Increased firmness is expected as shipyards change from construction to repair.

Warehouse . . .

Warehouse Prices, Page 158

Los Angeles — Expanding rocket production puts a continuous drain on all warehouse tubular stocks. Sheets, plates and alloy steels are also being depleted. Completion of shipbuilding is expected to relieve pressure for plates. Brokerage operations continue to compete with established warehouses.

St. Louis — Warehouse sales continue heavy and efforts to increase inventory are largely futile. Stocks are about 60 per cent of those of 1937 and assortments are broken. Calls for carload lots come from consumers whose mill orders have been superseded.

Seattle — Jobbers report steel supply still critical, with deliveries slow and many items almost impossible to obtain. Demand is good and turnover heavy. Sheets continue most critical, with cold-rolled steel, alloys and small bars also scarce. Reinforcing bar buying is confined to small lots. Plate stocks are improved but generally are well below normal.

Pittsburgh — Although the price situation has been cleared up somewhat, warehouses again are confused because of anticipated action on directives. Although official action has not yet been taken on all items, it seems certain that second and third quarter tonnage available to warehouses in all items will be substantially less in previous quarters. This does not promise much difficulty for the near future as stocks held by most jobbers are in fairly good shape with a wide range of sizes available in the basic products, including flat-rolled items.

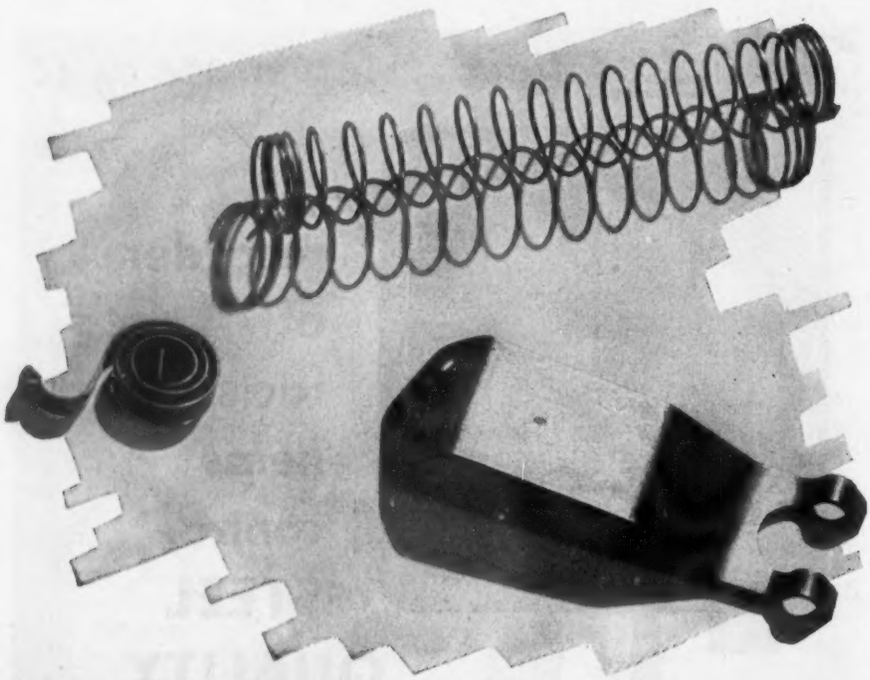
Cleveland — Shipments out of warehouse stock during March were up 10 to 15 per cent, reflecting inability of many steel consumers to get delivery from mills. Trend in warehouse inventories has been downward since the first of the year, with indications of an even steeper decline over the next month or so, for mill warehouse load directives have and may be further reduced.

Canada . . .

Toronto, Ont. — With reports from Europe indicating an early end to hostilities, Canadian industrial leaders again consider peace-time production, but so far there has been no actual reduction in Canada's war effort and industry is at peak on shells and munitions. Government interests in Ottawa point out, however, that with the end of fighting in Europe, Canada's war production schedules will be immediately cut 20 per cent and eventually will be reduced by 40 per cent of the present rate. The swing from war to civilian manufacturing is not held up only through labor shortage, but is due to lack of steel and other raw materials.

Plate demand has picked up considerably in the last week or two, with most buying associated with expanded shipbuilding activities and producers now report no additional capacities to the end of June. Large tonnage orders also are appearing from rolling stock builders and it is stated Eastern Car Company, Trenton, N. S., soon will be in the market for plate and other steel for a 500 freight car order it has just received from Canadian National Railways.

Scrap receipts continue to improve and dealers in turn have increased delivery to consumers. Incoming scrap, however is still only about 50 per cent of requirements. Improvement in supply of iron scrap was reported in the week, largely due to deliveries from outside points. While there is no surplus of cast scrap and stove plate dealers state that they are now in better position.



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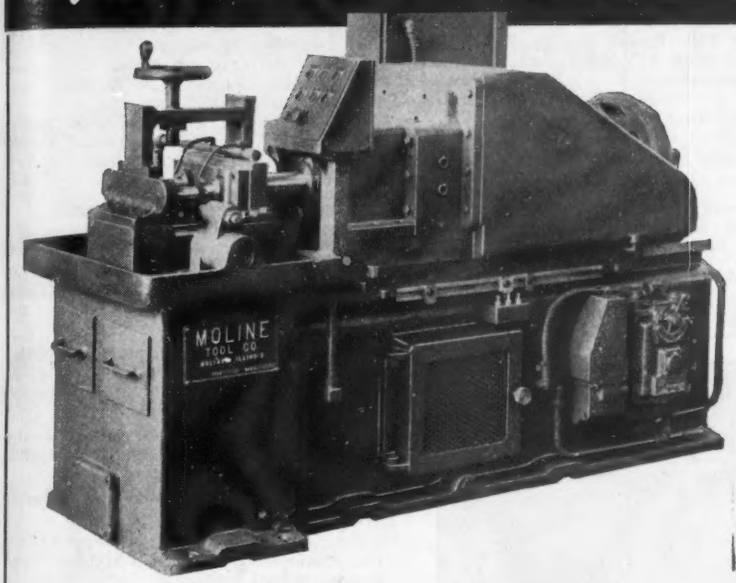

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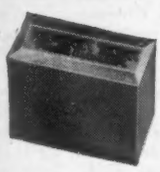
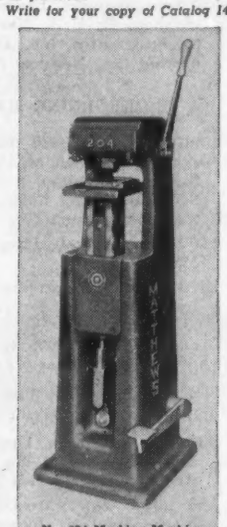
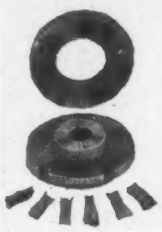


Flat Die for Marking Round Parts

Round Die for Marking Flat Parts



No. 204 Marking Machine



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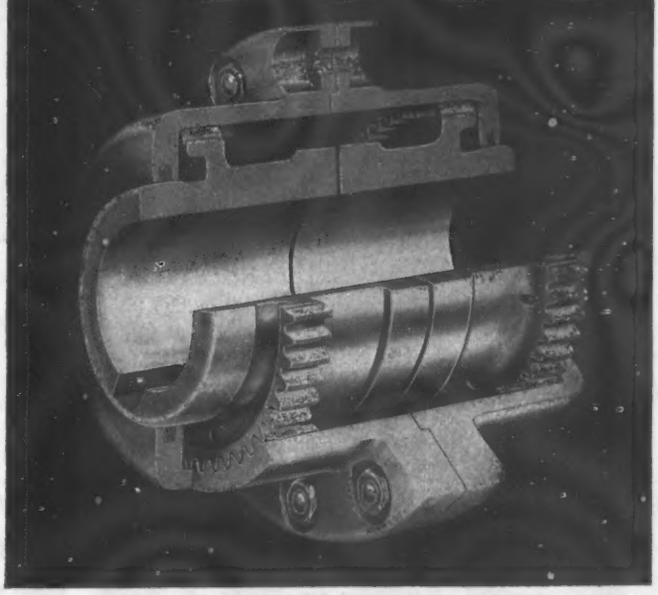

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Steel in Europe . . .

London — (*By Radio*) — Brisk demand is met in Great Britain from foundries engaged in essential work for the war program. Plate orders are increasing. Wire mills are active in meeting heavy demand. Call for tin plate is expanding.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2600 tons, truck tire plant, Ottawa, Ill., for Inland Rubber Corp., to Joseph T. Ryerson & Son Inc., Chicago; Darin & Armstrong Inc., Detroit, contractor; bids March 24.

2200 tons, manufacturing plant, unit 2, Detroit, for U. S. Rubber Co., to American Bridge Co., Pittsburgh.

1500 tons, 54 inert storage buildings, Hastings, Neb., for U. S. Naval Ammunition Depot, to Bethlehem Steel Co., Bethlehem, Pa., Maxon Construction Co., Dayton, O., contractor; bids March 14.

1500 tons, nylon salt plant, Orange, Tex., for E. I. du Pont de Nemours & Co. Inc., to Virginia Bridge Co., Roanoke, Va.

1000 tons, second plant extension, Chase Brass & Copper Co., Euclid, O., to American Bridge Co.; Stone & Webster Corp., Boston, engineer-contractor.

1000 tons, warehouses, Navy Department, Portsmouth, Va., to Bethlehem Steel Co., Bethlehem, Pa.

900 tons, paper mill, Mexico, to Bethlehem Steel Export Co., New York.

760 tons, truck tire plant, Newark, O., for Pharis Tire & Rubber Co., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, bridge, Red Wing, Minn., for Chicago, Milwaukee, St. Paul & Pacific railroad, to Wisconsin Bridge & Iron Co., Milwaukee; bids Feb. 3.

250 tons, tanker kingposts, for Sun Shipbuilding & Dry Dock Co., Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

207 tons, highway bridge, federal aid road between Fontanelle and Nickerson, Neb., for state, to Vincennes Steel Corp., Vincennes, Ind.; bids March 15.

200 tons, alterations, Baldwin Locomotive Works, Eddystone, Pa., to Belmont Iron Works, Philadelphia.

190 tons, powerhouse, Ephrata, Pa., to Phoenix Bridge Co., Phoenixville, Pa., Herman Wolson & Sons, Lancaster, Pa., contractors.

STRUCTURAL STEEL PENDING

7680 tons, 192 hangars, various locations, for U. S. Engineers, Columbus, O.

2850 tons, truck plant, Kansas City, Kansas, for Lee Rubber & Tire Corp., reported last week as 1500 tons.

1650 tons, storage buildings, McAlester, Okla., for U. S. Naval Ammunition Depot; J. A. Terterling Sons Co., Boise Idaho, low on general contract; bids March 27.

500 tons, addition, Ordnance Steel Foundry Co., Bettendorf, Iowa; Fegles Construction Co., Minneapolis, contractor.

440 tons, boiler plant, Baldwin Locomotive Works Eddystone, Pa.

225 tons, laboratory building, General Electric Co., Pittsfield, Mass.; Stone & Webster Corp., Boston, general contractor.

125 tons, addition, United States Rubber Co., Bristol, Conn.

REINFORCING BARS . . .

REINFORCING BARS PLACED

4000 tons, Naval depot, Hawthorne, Calif., to Soule Steel Co., San Francisco.

450 tons, U. S. Veterans hospital, Lexington, Ky., to West Virginia Steel & Mfg. Co., Huntington, W. Va., through H. P. Farnsworth Co.

430 tons, veterans' hospital, Dearborn, Mich., to Concrete Steel Co., through F. H. McGraw, New York.

300 tons, Lee Rubber Co., Kansas City, Mo., to Sheffield Steel Corp., Kansas City, Mo.

200 tons, additional navy storage facilities, Portsmouth, Va., to Virginia Steel Co., Richmond, Va.

150 tons, barracks, hangar, and administration building, for U. S. Navy, Chincoteague, Va., to Hall-Hodges, Inc., through Virginia Engineering Co., Newport News, Va.

REINFORCING BARS PENDING

3500 tons, also 325 tons wire mesh, inert storage buildings, McAlester, Okla., for U. S. Naval Ammunition Depot; J. A. Terterling Sons Co., Boise, Idaho, low on general contract; bids March 27.

1400 tons, naval depot, Crane, Ind.; bids Mar. 27.

1375 tons, 50 smokeless powder igloos, Crane Ind., for U. S. Naval Ammunition Depot; Maxon Construction Co., Dayton, O., low on general contract; bids March 27.

700 tons, water works, Louisville, Ky.

300 tons, ordnance plant, Charleston, Ind.

200 tons, U. S. Rubber Co., Detroit.

200 tons, expansion, Gopher Ordnance Works, Rosemont, Minn., for E. I. du Pont de Nemours & Co.; bids March 22.

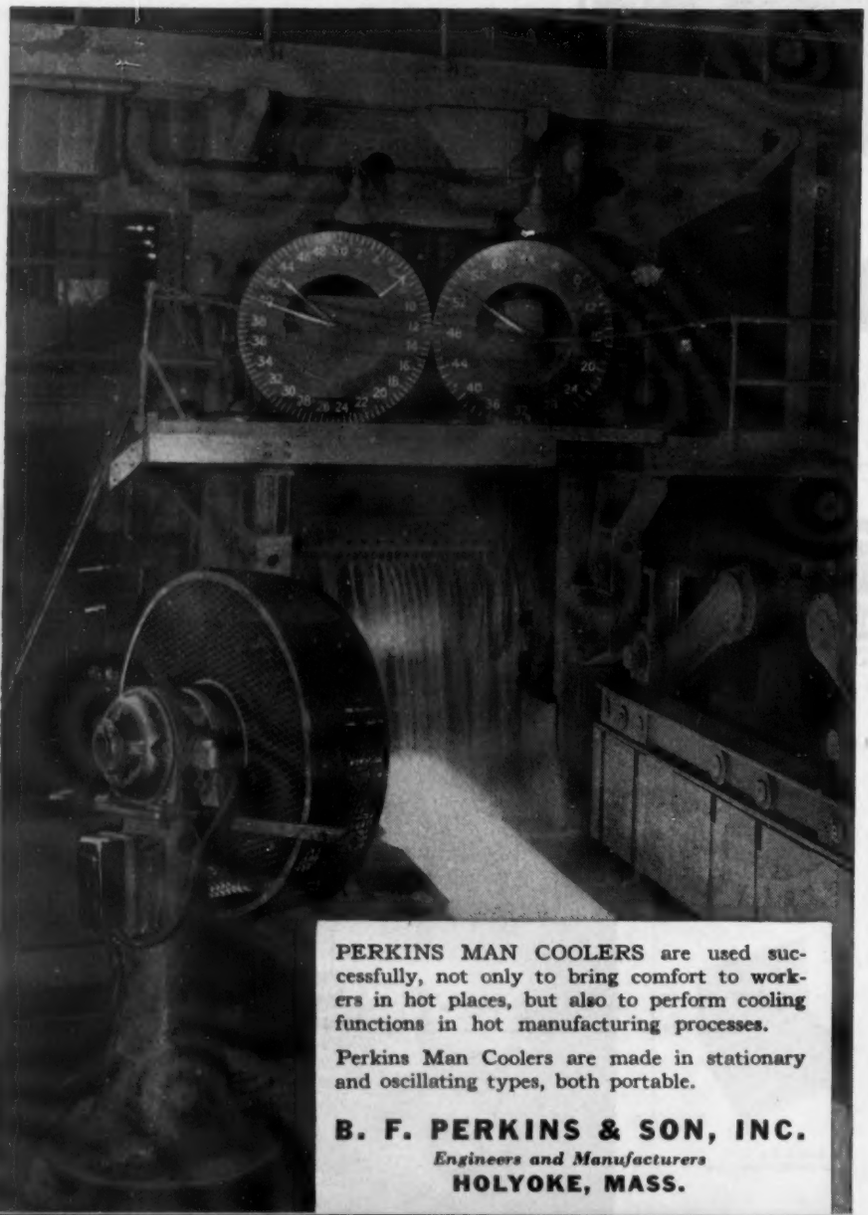
180 tons, Navy warehouse projects, Bayonne, N. J.; John A. Johnson, Brooklyn, N. Y., low.

125 tons, U. S. Veterans hospital, Bedford, Mass.

100 tons, boat house and dock, Sault Ste. Marie, Mich., for Army Engineers; general contract to Merritt-Chapman-Scott Co., New York; bids March 21.

100 tons, Armour & Co., Sioux City, S. Dak.

Unstated tonnage, runways and drainage outlets, Municipal Idlewild Airport, New York; bids April 4.



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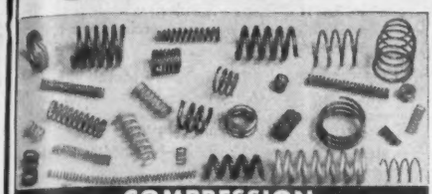

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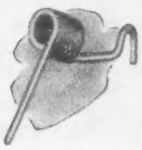

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Torsion spring with special hook end.

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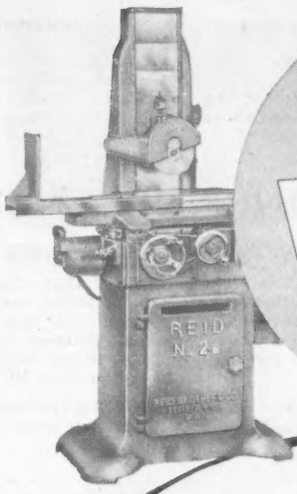

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Designed for: "Come-alongs" on welded assemblies; lifting oil and ash barrels and other metal barrels or box containers; lifting large stamped tank heads or tops; angles and structural assemblies. Drop forged completely in ½-ton, 1-ton, 3-ton and 6-ton capacities.

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Canadian National Railways, 500 fifty-ton box cars to Eastern Car Co. Ltd., Trenton, Nova Scotia.

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Pere Marquette, eight 1000-horsepower diesel-electric locomotives, to Electro Motive Division, General Motors Corp., La Grange, Ill.; in addition to two recently reported placed.

CONSTRUCTION AND ENTERPRISE

OHIO

CANTON, O.—Hercules Motors Corp., 101 Eleventh street, will build a two-story concrete building and one-story brick building 90 x 160 feet, at cost of about $1,500,000. War Production Board approval has been granted.

CLEVELAND—Accurate Diecasting Co., M. N. Siwak, 3089 East Eightieth street, will build foundry building to cost about $13,500.

CLEVELAND—Consolidated Iron & Steel Co., J. F. Maine, engineer, 1290 East Fifty-third street, will make plant alterations and install shakeout belt conveyor, rotary screen, etc., to cost about $105,000. WPB approval expires June 30.

CLEVELAND—Mercury Products Co., 423 Euclid avenue, has been incorporated with $500 capital and 600 shares no par value stock to manufacture machines and machine tools, by William E. Ranney, who is secretary-treasurer of Colonial Electric Co. at the same address.

COLUMBUS, O.—Columbus Metal Products Inc., 767 North Fourth street, sheet metal stamping manufacturer, has bought about three acres near West Fifth avenue and Norton avenue. G. Edwin Smith is president of the company.

MASSILLON, O.—Republic Steel Corp., 1210 Republic building, Cleveland, care Union Drawn Steel Division, Rose avenue, Massillon, will construct plant buildings here and install equipment, estimated cost $76,800.

STEUBENVILLE, O.—Wheeling Steel Corp., 1134 Market street, Wheeling, W. Va., will make additions and repairs at ore-handling facilities at Steubenville, at cost of about $24,000.

NEW JERSEY

NEWARK, N. J.—Fiske Bros. Refining Co., 129 Lockwood street, is having plans prepared by Robert Klemm, 944 Broad street, for a two-story 50 x 175-foot manufacturing building and warehouse, to cost about $100,000.

PAULSBORO, N. J.—Socony Vacuum Oil Co. has let contract to Skinner, Cook & Babcock Inc., 60 East Forty-second street, New York, for a one and two-story lubricating oil pilot plant laboratory building, to cost about $75,000.

PENNSYLVANIA

GROVE CITY, PA.—P. Wall Mfg. Supply Co., Preble avenue, Pittsburgh, J. R. Hollingsworth, vice president, will move into a two-story 50 x 200-foot plant here, purchased from McKay Body Works. Its Pittsburgh plant has been sold. Products include stampings for war contracts and subcontracts.

ST. MARYS, PA.—Stackpole Carbon Co., 201 Tannery street, will build a one-story 50 x 254-foot glass processing plant, to cost about $50,000.

MICHIGAN

DETROIT—Packard Inc., 1580 East Grand boulevard, has been incorporated with $1000 to manufacture engines, motors, trucks and machinery, by Milton Tibbetts, same address.

DETROIT—Murray W. Sales & Co., 801 West Baltimore street, has been incorporated with $750,000 capital to manufacture plumbers' and steamfitters' supplies, by Murray W. Sales, same address.

GRAND RAPIDS, MICH.—Grand Rapids Tool & Engineering Co., 336 Michigan Trust building, has been incorporated with $50,000 capital to manufacture tools, dies and stampings, by Robert C. Luce, 617 Rosewood street SE.

JACKSON, MICH.—F. A. Luthy Co., 302 Cooper street, has been incorporated with $75,000 capital to manufacture tools, by Frederick A. Luthy, same address.

SAGINAW, MICH.—Louis Rose Refining Co., 7177 Washington street, is having plans prepared for a refinery addition to cost about $150,000.

ILLINOIS

MOLINE, ILL.—Herman Nelson Corp., manufacturer of heating and air conditioning equipment, has let contract to Priester Construction Co., Davenport, Iowa, for a plant addition to cost about $200,000.

INDIANA

HAMMOND, IND.—Stauffer Chemical Co., Indianapolis boulevard, has let contract to Leonard Construction Co., 37 South Wabash avenue, Chicago, for a sulphuric acid plant costing about $650,000.

SOUTH BEND, IND.—Oriental Wrought Iron Works Inc., 1702 Mishawaka avenue, has been incorporated with 1000 shares no par

RANSOHOFF

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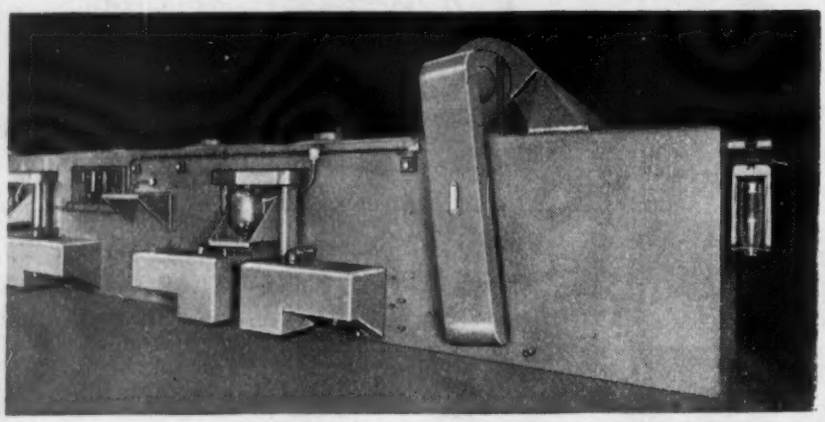
Eqiupment for the surface treatment of metals



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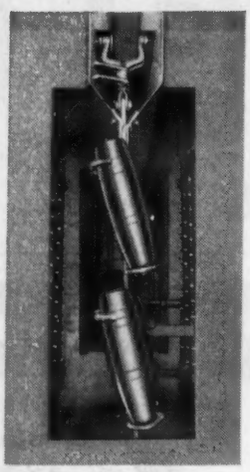

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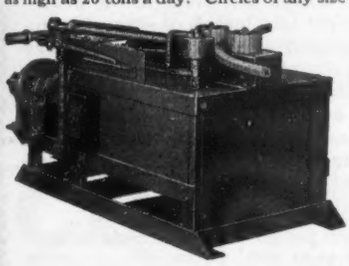

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4,000 Parts Per Day With DI-ACRO Bender

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value to manufacture metal furniture and novelties, by J. J. Kohen and associates.

SULLIVAN, IND.—Sullivan Metal Products Corp. has been incorporated to manufacture machine tools, fixtures and other metal products, with 1000 shares no par value, by Cyril G. Whitemoss, Fred McDonald and Charles H. Stevens.

MARYLAND

BALTIMORE—K. & G. Sales Co. is rebuilding burned section of its plant at 1305 Maryland avenue.

BALTIMORE—Frank G. Scheunit Rubber Co., 3901 Clipper road, Woodberry, Md., will build a four-story plant addition containing about 14,000 square feet floor space for manufacture of aviation tires, inner tubes and similar products.

BALTIMORE—Flynn & Emerich Co., Grantley avenue and Western Maryland railroad, will build a core-room extension 45 x 65 x 80 feet. Plans are being made for further expansion later.

ALABAMA

TUSCUMBIA, ALA.—Robins Tire & Rubber Co. is having plans prepared by H. A. Griffith Jr., Sheffield, Ala., for a one-story 100 x 500-foot and part two-story 100 x 100-foot tire factory, estimated to cost about $500,000.

WEST VIRGINIA

FOLLANSBEE, W. VA.—Wheeling Steel Corp., 1134 Market street, Wheeling W. Va., will extend its ore storage yards at East Steubenville, O., at cost of $95,000.

VIRGINIA

ALEXANDRIA, VA.—City manager, City Hall, plans construction of a sewage treatment and disposal plant to cost about $500,000. Greeley & Hansen, Adams building, Norfolk, Va., are consulting engineers.

MISSOURI

POPLAR BLUFF, MO.—Missouri Utilities Co., H. B. Newman, president, Cape Girardeau, Mo., has let contract to McCarthy Bros. Construction Co., 4903 Delmar boulevard, St. Louis, for a power plant costing about $130,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are engineers.

ST. LOUIS—Monsanto Chemical Co., South Second street, has let contract to Leonard Construction Co., 37 South Wabash avenue, Chicago, for a sulphuric acid plant, to cost about $700,000.

WISCONSIN

BELOIT, WIS.—Fairbanks, Morse & Co., A. C. Howard general manager, has let contract to Cunningham Bros. for a diesel locomotive shop 80 x 200 feet, 55 feet high, equipped with cranes.

MILWAUKEE—Garyait Machine Co. has been incorporated by Henry Garyait, 3847 North Eleventh street, and associates.

MINNESOTA

BRAINERD, MINN.—Northern Pacific Railroad, Railway building, St. Paul, has let contract to Al Johnson Construction Co., Foshay Tower, Minneapolis, for a freight car repair shop 180 x 575 feet and warehouse and miscellaneous shop buildings, to cost about $1,500,000. Overhead cranes, hoists and other equipment will be installed.

MINNEAPOLIS—Northwest Automatic Products Corp., 170 Lyndale avenue North, manufacturer of screw machine products, suffered estimated loss of $600,000 by fire to its main plant, including machinery and equipment.

MINNEAPOLIS—Northwest Steel & Supply Co., 900 Edison building, has been incorporated to manufacture steel products and oper-

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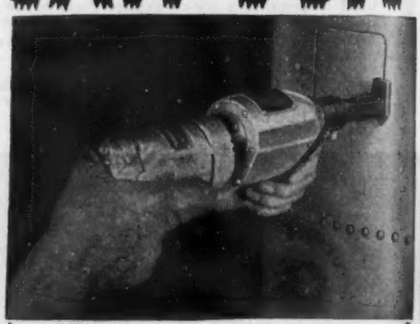
THE NEW SAW-GUN



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The Saw-Gun, illustrated above, will definitely speed up sawing and filing operations in your plant. Attach it to an electric drill, or propel it with compressed air or flexible shaft. Insert a hack saw blade in the holder and cut into metals of every description with astounding speed. Works equally well on plastics, wood and other materials. Ideal for panel notching and slotting operations. It's portable . . . carry it from job to job. For filing operations insert a file in special holder.

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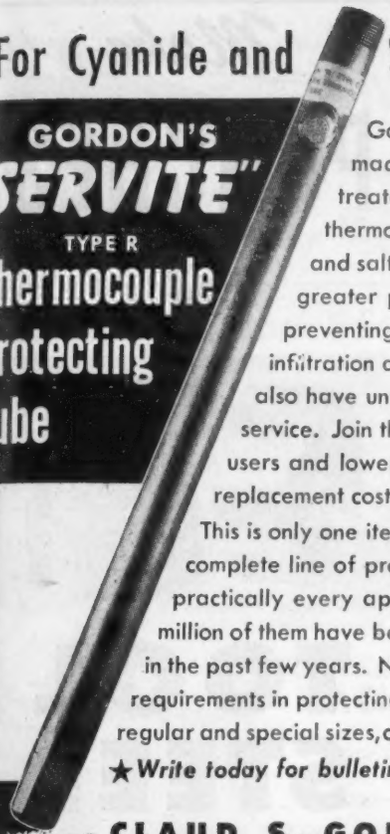

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Gordon Type R tubes, made and specially treated for use with thermocouples in cyanide and salt baths, not only give greater protection by preventing detrimental gas infiltration and penetration, but also have unusually long life in service. Join the many satisfied users and lower your tube replacement costs.

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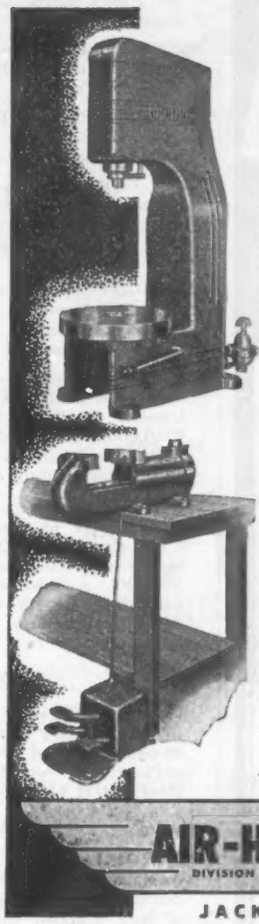

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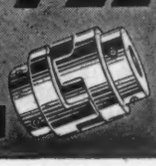

A complete line of non-lubricated flexible couplings—a size and type for practically every purpose. Sales offices in principal industrial centers. (See Classified Directory) or write main office and factory for engineering data and catalog.

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Specialized cleaning
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

ate a steel warehouse, by Paul G. Rast and associates.

MINNEAPOLIS—General Mfg. Co., 4204 North Mississippi drive, will build a one-story machine shop addition.

MINNEAPOLIS—B B Foundry & Stove Works, 245 Twelfth avenue South, recently suffered heavy fire loss by burning of foundry.

NEW ULM, MINN.—New Ulm Mfg. Co., manufacturer of expansion reamers and other tools, has let contract to Heymann Construction Co. for a one-story factory 60 x 150 feet.

ST. PAUL—General Tool Co., 250 East Fifth street, has been incorporated to manufacture tools and machinery, by Russell W. Waldo, Charles Blossom and Leon Ratte.

ST. PAUL—Ralph Maxson, Canton, O., has bought the St. Paul Engineering & Mfg. Co., formerly St. Paul Foundry Co., for about $950,000. Company does structural steel fabricating and manufactures machinery. It is making cargo-lifting devices for war use.

ST. PAUL—Minnesota Mining & Mfg. Co., manufacturer of abrasives, etc., will build a four-story factory 200 x 508 feet for manufacture of Scotch tape, to cost about $2,500,000. A one-story plant 50 x 75 feet will also be built to house rubber compounding equipment and another to house laboratories.

TEXAS

ORANGE, TEX.—Kemso Chemical Products Inc., 1203 Milby street, Houston, Tex., plans to erect two plant additions for a galvanizing unit, to cost about $75,000, and a pickling plant costing $40,000.

IOWA

DES MOINES, IOWA—Globe Hoist Co. has let contract to the Weitz Co. for a one-story machine shop addition 40 x 100 feet. Brooks & Borg, Hubbell building, are architects.

DURANT, IOWA—Board of trustees will open bids April 2 for equipment for the municipal power and light plant, including diesel engine generating unit.

WATERLOO, IOWA—Rath Packing Co. has let contract to W. A. Klinger Co., Warnock building, Sioux City, Iowa, for two three-story plant additions, to cost about $150,000.

WYOMING

COWLEY, WYO.—General Petroleum Corp. will let contract soon for a skimming plant to cost about $825,000.

CALIFORNIA

BURBANK, CALIF.—Atlas Engineering Co., 6919 San Fernando road, is building a shop addition.

LOS ANGELES—Pioneer Blacksmith & Welding Co. has been incorporated with $50,000 capital by Francis P. Trickhaus of San Gabriel, Calif., and Edward D. Garratt and Lew L. Weber of Los Angeles.

LOS ANGELES—H. S. Smith Oil Tool Co., Compton and Avalon boulevards, will build a heat treating building, one story, 60 x 100 feet.

LOS ANGELES—Master Tool & Gauge Co. has been formed by Edward Kellerman and associates and has established its plant at 225 West Pico boulevard.

PASADENA, CALIF. — Aerojet Engineering Corp., 285 West Colorado street, has plans for 15 to 20 new buildings, some of frame and stucco and others of steel frame. Larger structures will be let to contractors to meet 60-day deadline. Cost of building estimated at $335,000 with utilities $185,000 additional. Defense Plant Corp. has provided $1 million funds. (Noted March 5.)

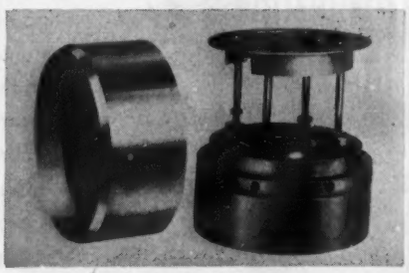
SOUTH GATE, CALIF.—Tucker Tool Works, 10018 Adella avenue, will build a machine shop plant to cost $2260.

VERNON, CALIF.—Ideal Hardware & Supply Co. is building a warehouse structure 120 x

Make

PUNCHES

of



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A large sandpaper manufacturer decided that tool cost was too high and turned to tool steel tubing for the punch and die set shown above. Five of these units on a gang press stamped out 128,000 discs before regrinding, doubling all existing records. Elimination of boring in fabricating the dies cut time and cost, too. Perhaps tool steel tubing would solve one of your tooling problems.

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$17\frac{1}{16} \times (\frac{39}{8} \times \frac{53}{16}) = 17\frac{1}{16} \times \frac{2067}{128}$

$17\frac{1}{16} \times 16\frac{19}{128} = \frac{273}{\cancel{16}\ 1} \times \frac{\cancel{2048}^{\cancel{128}}}{\cancel{128}\ 1} = 273$

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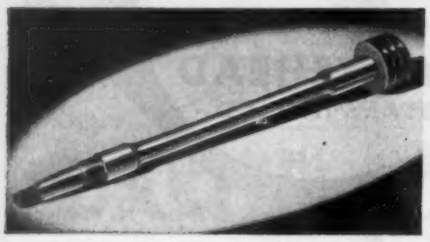
Lobbing Howitzer Heavies on the Target



Blasting the way through well-fortified lines calls for heavy ordnance—accurately aimed. Because of the long distances from the guns to the target, any errors in the aiming-mechanism are multiplied many times over.

This worm-shaft is part of the sighting-device on a 105-mm. howitzer. Ace machines and grinds them complete from heat-treated forgings. The worm thread, and the class 3 threads at the small end of the shaft, are ground from the solid. The whole job involves very careful machining and grinding and is typical of Ace facilities and abilities.

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204 feet at 3050 Leonis boulevard, costing about $55,000.

VERNON, CALIF.—C. B. S. Steel & Forge Co., 3321 East Slauson avenue, will build craneway costing about $1500.

OREGON

MEDFORD, OREG.—California-Oregon Power Co. has filed application for permission to make preliminary surveys for a proposed $4 million hydroelectric plant on North Umpqua river.

SALEM, Oreg.—W. W. Risebraugh Co., 680 South Seventeenth street, manufacturer of steel furnaces and tanks, is having plans prepared for a plant addition to cost about $10,000.

WASHINGTON

SEATTLE—True's Oil Co., Cecil L. True, president, has plans for postwar expansion, including a 100 x 300-foot structure, for which a site has been bought.

CANADA

DRUMHELLER, ALTA.—Canadian Utilities Ltd., 215 Sixth street, West Calgary, plans to start work on plant addition here and installation of equipment to cost about $35,000.

ESSEX, ONT.—Stokely-VanCamp of Canada Ltd. plans to start work soon on plant addition here to cost, with equipment, approximately $85,000.

NIAGARA FALLS, ONT.—Canadian Ramapo Iron Works Ltd., 560 Portage road, is calling tenders for plant addition estimated to cost with equipment about $50,000. J. Baumann is plant superintendent.

WELLAND, ONT. — Canada Foundry & Forgings Ltd. plans to start work soon on construction of plant addition to cost with equipment about $25,000.

WEST LORNE, ONT.—Erie Flooring & Wood Products Ltd. plans large additions to its woodworking plant here as a postwar project, estimated to cost with equipment about $100,000.

LONGUEIL, QUE.—Fairchild Aircraft Ltd. is considering plans for plant addition estimated to cost with equipment about $170,000.

MONTREAL, QUE.—Lamont Alloy Foundry Ltd., 4 Allice street, Joliette, is having plans prepared by G. E. DeVarennes, architect, 411 Gouin boulevard, East, for construction of plant here, to cost about $40,000.

SHERBROOKE, QUE.—Christlea Aircraft Co., London, England, plans aircraft assembly plant here as a postwar project, estimated to cost about $200,000.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Jack & Heintz, Cleveland, preliminary commitment of $1,200,000 to provide additional equipment at a plant in Cleveland.

Ampco Metal Inc., Milwaukee, $260,000 increase in contract to provide additional facilities at a plant in Milwaukee, making overall commitment $2,150,000.

Heintz Mfg. Co., Philadelphia, $200,000 to provide equipment at a plant in Philadelphia.

Triangle Conduit & Cable Co. Inc., New Brunswick, N. J., $35,000 increase in contract to provide additional equipment at a plant in New Brunswick, making overall commitment $85,000.

Plymouth Rubber Co. Inc., Canton, Mass., $90,000 increase in contract to provide equipment at a plant at Canton, making overall commitment $600,000.

Airesearch Mfg. Co. of Arizona Inc., Phoenix, Ariz., $365,000 increase in contract to provide equipment at Phoenix, making overall commitment $2,200,000.

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2—Yale & Towne Mfg. Co. Walker Div. Electric Battery Trucks. Capacity 18000# each. Wheel base 11'9". Complete with Exide storage battery
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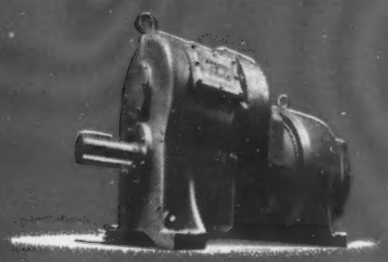

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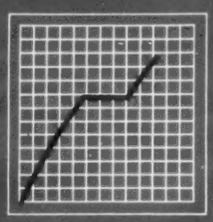

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PROVEN RELIABILITY
Their durability and stamina have been proven with millions of hours of service all over the world.

UNDIVIDED RESPONSIBILITY
The complete Gearhead Motor is designed and built by one manufacturer in one plant.

COMPACT
Integral, compact design saves space, saves money, improves appearance.

TAKING THE "CAN'T" OUT OF CRANES

New Cutler-Hammer Control avoids need for special power

Years ago, when America's factories first used electric motors, there was only one kind of power available. It was Direct Current, familiarly known as "dc". But this type of current had one serious disadvantage. It *had* to be used within a few miles of the place where it was generated. So engineers turned their attention to Alternating Current, or "ac", which *could* be produced efficiently in great quantities at one point and carried by wires for *hundreds* of miles in every direction to supply power to *thousands* of users. Today, 97% of Industry's electric motors operate on alternating current. The nation is spanned by great "ac" networks. Factories need no longer be jammed into congested districts. Electric power is *everywhere*.

The question might well be asked, "Why do 3% of Industry's electric motors still operate on dc?" It is because certain jobs require very accurate speed control for which all of America's engineers have been unable to find better answers than the direct current motors being used. But the search goes on and on. Until just recently, most overhead traveling cranes simply *had* to have dc. It often meant the installation of special direct current generating machinery or other expensive electrical equipment just to run the crane. There was no other answer to the accurate spotting of crane loads or the smooth lowering of loads . . . until Cutler-Hammer engineers announced one of the most ingenious control systems of all time, Cutler-Hammer AC Crane Control. Now *standard* alternating current motors can be used on cranes. Loads *can* be spotted with precision. Loads *can* be handled with such perfect control through *five* stable dynamic lowering speeds that operators cannot tell the performance from dc. The it-can't-be-done-with-ac tradition has been shattered again. More factories than ever before can now install the cranes they need. And another demonstration of Cutler-Hammer engineering leadership appears on the record for your consideration in the purchase of *any* motor control equipment. CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto.

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